APPLICATION OF

APPALACHIAN POWER COMPANY **CASE NO. PUE970766**

For certificates of public convenience and necessity authorizing transmission lines in the Counties of Bland, Botetourt, Craig, Giles, Montgomery, Roanoke and Tazewell: Wyoming-Cloverdale 765 kV Transmission Line and Cloverdale 500 kV Bus Extension

REPORT OF HOWARD P. ANDERSON JR., HEARING EXAMINER

October 2, 2000

HISTORY OF THE CASE

On September 30, 1997, Appalachian Power Company ("APCo" or the "Company")[1] filed an application to amend its certificates of public convenience and necessity authorizing the construction and operation of the Virginia portion of a 765 kV transmission line through the Counties of Bland, Botetourt, Craig, Giles, Montgomery, Roanoke and Tazewell, Virginia. The transmission line, as originally proposed, would originate at AEP's Wyoming Station, near Oceana, West Virginia, and terminate at the Company's Cloverdale Station in Botetourt County, Virginia ("Cloverdale Alternative"). The Company has further applied to amend its certificate for Botetourt County to construct a 500 kV bus extension from its existing Cloverdale Station 765 kV switchyard to the existing Cloverdale Station 345 kV switchyard.

Pursuant to Commission Order for Notice and Hearing of November 7, 1997, notice of the Company's application was published and local hearings were held in the Counties of Tazewell, Bland, Giles, Montgomery and Roanoke, as well as in the City of Richmond.

On September 15, 1998, the Commission Staff filed a Motion for Ruling Directing Study of Alternative Project, requesting that the Company be directed to study an alternative 765 kV transmission line from the Wyoming Station to the Jacksons Ferry Station located in Wythe County, Virginia (the "Jacksons Ferry Alternative"). By Hearing Examiner's Ruling dated September 22, 1998, the Company was directed to study the Jacksons Ferry Alternative and file a report with the Commission. The Company filed its report on May 7, 1999, identifying a preferred route and a number of alternative corridors. The preferred and alternative corridors of the Jacksons Ferry Alternative cross the Counties of Tazewell, Bland, Pulaski, Wythe and Giles.

[1] APCo is a subsidiary and operating company of American Electric Power ("AEP"). References to APCo will pertain to its service region which includes Southwest Virginia.

By Hearing Examiner's Ruling of June 1, 1999, the Company was directed to publish notice of the Jacksons Ferry Alternative; public hearings were set for the Counties of Bland, Pulaski, Tazewell, and Wythe; and a procedural schedule was established.

Protests were filed by the Town of Bluefield; Kent Carlson, Lori Landis Carlson, Emma Carlson; the Board of Supervisors of Montgomery County ("Montgomery County"); Citizens United to Protect Tazewell County, Inc.; Greater Newport Rural Historic District Committee; Roanoke Appalachian Trail Club ("RATC"); Board of Supervisors of Giles County ("Giles County"); Citizens Organized for the Preservation of the Environment of Giles ("COPE"); Citizens for the Preservation of Craig County; Roanoke Preservation League; the Board of Supervisors of Tazewell County ("Tazewell County"); the Board of Supervisors of Bland County ("Bland County"); Friends of Regional Culture & Environment ("FORCE"); Alliance for the Preservation and Protection of Appalachian Land ("APPAL"); Deborah A. Dull; Weaver Enterprises, Inc.; and the Board of Supervisors of Wythe County ("Wythe County").

On September 29, 1999, counsel for Protestants Bland County, Wythe County, APPAL and COPE filed a Motion to Suspend Procedural Schedule and to Establish a New Procedural Schedule. After oral argument on October 14, 1999, a new procedural schedule was established and the evidentiary hearing was scheduled to commence May 1, 2000.

That hearing was convened as scheduled on May 1. Counsel appearing were H. Allen Glover, George J. A. Clemo and Michael J. Quinan for the Company; Kenworth E. Lion, Jr. for Bland County, et al.; Matt Pethybridge for Giles County, et al.; Deanis L. Simmons for Tazewell County; Stephen E. Arey for the Town of Bluefield; and William B. Hopkins for Weaver Enterprises. Wayne N. Smith and William H. Chambliss appeared for Commission Staff. Proof of public notice was marked as Exhibit A and made a part of the record. Briefs were filed on July 24, 2000. The transcripts of the proceedings totaling 3,720 pages are filed with this Report.

SUMMARY OF THE PROPOSED PROJECTS

The Wyoming-Cloverdale 765 kV transmission line would consist of a single three-phase 765 kV circuit, extending a distance of 132 miles (preferred corridor) from the Wyoming Station to the Cloverdale Station. The transmission line corridor would be approximately 100.4 miles in length in Virginia. The transmission line would consist of a combination of self-supporting and guyed-V lattice galvanized steel towers[2] and would require a 200 foot right-of-way. The line would require approximately four to five towers per mile with an average tower height of 132 feet. The minimum clearance between the ground and the conductors would be 44 feet under maximum operating conditions or under severe ice loading conditions.

The Wyoming-Jacksons Ferry Alternative 765 kV transmission line would also consist of a single three-phase 765 kV circuit covering a distance of approximately 90 miles (preferred corridor) from the Company's Wyoming Station near Oceana, West Virginia, to the Company's Jacksons Ferry Station near Wytheville, Virginia. This transmission line corridor would extend approximately 57.1 miles in Virginia. The design characteristics would be the same as above.

[2]Diagrams of the towers are found in Appendix A of this Report.

In an effort to mitigate the visual impact of the transmission line, the Company proposes to construct the towers with darkened steel and use non-specular wire for the conductors. A six-bundle conductor configuration will be used to reduce noise from the line.

The proposed 500 kV bus extension would be a single three-phase 500 kV circuit, running approximately 3,100 feet from the Company's 765 kV switchyard to the 500/345 kV switchyard at its Cloverdale Station. The bus extension would use self-supporting lattice galvanized steel towers and would require a 175 foot right-of-way for the approximately 1,500 feet of the bus extension which would be outside the Company's existing facilities at Cloverdale. The towers would have an average height of approximately 125 feet, with minimum clearance between the ground and the conductors of 40 feet under maximum operating conditions or severe ice loading conditions. As pointed out by Company witness Poff, regardless of whether the Cloverdale or Jacksons Ferry terminus is approved, the Company still needs the 500 kV bus extension at Cloverdale Station.[3]

PUBLIC HEARINGS

In 1998 and 1999, public hearings were held in the localities impacted by the Wyoming-Cloverdale Alternative and the Wyoming-Jacksons Ferry Alternative.[4] Over five hundred public witnesses testified at the public hearings. The overwhelming majority of the public witnesses were opposed to any transmission line in Southwest Virginia. Primarily, the public witnesses viewed the proposed transmission line as a symbol of corporate greed imposed at the expense of the cultural attachment of the people to their land[5] and the scenic beauty of the region.[6] The typical setting in the proposed and alternate corridors is pastoral – rolling fields and hills with mountain backdrops and cattle and sheep farms with streams running through them. The proposed transmission line was described as a means of transporting electricity generated in the Midwest to sell in the Northeast United States, enriching AEP shareholders.[7] The majority of public witnesses believe the proposed transmission line is not needed for Southwest Virginia.[8] James McGrath charges that "AEP has raised the jolly roger on the flagship of corporate buccaneering."[9]

Potential health concerns linked to the proposed transmission line include contamination of groundwater and surface water[10] from herbicides and other chemicals sprayed on the rights-of-way,[11] increased incidence of cancer caused by electromagnetic fields ("EMF") radiating from the line,[12] and increased air and water pollution from coal-fired generating units brought on-line to provide power to be transported over the line. Noise from the transmission line is also a concern.[13]

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[3]Tr. 3673, 3679.
[4]In addition to hearing public witnesses in Richmond, nine local hearings were held in seven counties in Southwest Virginia. Hearings were held in Tazewell and Bland in 1998 and 1999.
[5]Tr. 183, 593, 601, 671, 732, 747, 880, 935, 966, 976, 1017, 1063, 1100, 1136.
[6]Tr. 112, 767, 774.
[7]Zane Dale Christian argued that AEP is building this transmission line at the expense of its customers to position itself for deregulation. (Tr. 1945; Tr. 100, 140, 818, 1119, 1360, 1711, 1867, 2361).
[8]Tr. 107, 197, 199, 204, 769, 778, 825, 838, 2327.
[9]Tr. 930.
[10]Tr. 108, 121, 153, 181, 739, 791, 959.
[11]Tr. 104, 148.
[12]Tr. 17, 166, 1875.
[13]Tr. 904, 917.

David Miller stated that, regardless of the findings of epidemiological studies, people believe that EMF causes cancer.[14] However, David Orcutt maintained that the electric power industry and state and local governments have decided that EMFs are not hazardous to human health when it comes to making critical decisions concerning the placement of power lines.[15]

In many of the mountain areas, springs are the sole source of water,[16] and residents fear contamination by chemicals. Because the region has a high degree of karst topography,[17] there is very little natural filtration of groundwater. Several witnesses testified to the belief that APCo's application of herbicides to maintain rights-of-way would contaminate groundwater.

Douglas Perkins has been caving in Bland County since 1968. He explained that the cave system along Big Walker Mountain is extensive;[18] some of the caves have rooms the size of a high school gymnasium.[19] The caves were carved out of limestone by water erosion. Mr. Perkins is also concerned with herbicide contamination of the groundwater. He testified that any disturbance of the sensitive rock formations can alter or eliminate mountain springs, making blasting for tower foundations a concern.[20]

Liza Field advocated conservation of electric energy rather than increased consumption, noting that AEP promotes energy use. She stated that residents hate these transmission lines and are tired of sacrificing their land and mountains to this power company.[21] Noting the National Forest Service blocked APCo's prior attempt to build this transmission line through the National Forest, Donna Muhley questioned, "How can this line not be as harmful to our communities as it is for our National Forest. It can't."[22] Joe Swim claimed that it is easier for AEP to pick on private citizens than the National Forest Service.[23]

Richard Hirsh, a professor at Virginia Tech who has participated in and studied the electric utility industry since 1979,[24] stated there are better and more cost-effective ways to meet increasing energy demand. He advocates demand side management and local generation. For example, Mr. Hirsh pointed to other utilities such as Pacific Gas and Electric Company of California that spent approximately $90 million on energy efficiency programs and reduced demand by more than 1100

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[14]Tr. 1670.
[15]Tr. 230.
[16]Tr. 1685.
[17]Karst is a geologic and geographic term for landscapes and landforms produced by the erosion of limestone by water. It includes features such as caves, sinkholes, sinking streams and springs.
[18]I gained firsthand experience with this cave system by spending five to six hours in the Newberry-Bane cave system located under Big Walker Mountain.
[19]Tr. 1895.
[20]Id.
[21]Tr. 2366.
[22]Frances Sheppard, of Abbs Valley, noted that since the Forest Service has determined the environmental consequences of the proposed transmission line are too great for it to cross public land, should private land be any less valuable? (Tr. 89; Tr. 1745).
[23]Tr. 566.
[24]Mr. Hirsh was invited to speak before the Virginia House-Senate committee investigating electric utility restructuring. (Tr. 290).

megawatts, the equivalent of a power plant. Similar savings have been achieved in New England, Wisconsin, New York and the Pacific Northwest.[25]

William Freeman, a member of the Giles County Board of Supervisors, argued there has been no compelling evidence of the need for the proposed transmission line and much less intrusive solutions are available. He pointed out that power outages have generally occurred as the result of poor engineering and Mother Nature. Outages in Southwest Virginia are usually caused by ice storms and ice will take out a transmission line regardless of its size.[26] Robert Cunningham stated that if AEP is concerned about reliability, it would build local generation instead of stretching a fragile power line across the mountains.[27]

Theresa Burriss-Stanley pointed out that AEP derives most of its power from coal-fired power plants that enjoy protection from federal clean air standards under a grandfather clause. As a result, AEP is the second largest emitter of nitrogen oxides which cause acid rain and smog.[28] Witnesses pointed out that the proposed transmission line will simply allow AEP to increase its use of these highly polluting power plants.[29]

Specifically, Deborah Little testified that AEP's thirteen coal-fired generating plants released more than 113 million pounds of toxic chemicals into the environment last year. She pointed out that AEP's John Amos plant alone releases 15.3 million pounds of hydrochloric acid, 865,000 pounds of hydrofluoric acid, 830,000 pounds of sulfuric acid and more than one million pounds of barium and smaller amounts of arsenic, nickel, mercury, and dioxins.[30]

Sam Hicks portrayed AEP as a "big polluter" that buys pollution rights from other companies. Although its power is now inexpensive, if AEP were made to clean up its plants, its electricity would not be so cheap. Mr. Hicks stated that he could afford an increase in his electric bill in order to save what cannot be replaced – the environment.[31]

Many witnesses were concerned that the proposed line would have a negative impact on tourism in the area. Christopher Swan repeated this comment. A large number of Virginia's tourists travel to the area to see its majestic mountains and natural beauty.[32] Matthew Martin pointed out that these tourists would instead be confronted with a view of the transmission line, a symbol of the development they have attempted to escape.[33] Many visitors also come to Southwest Virginia for its recreational attractions. These attractions include mountain biking,[34] hiking,

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[25]Mr. Hirsh acknowledged that because electricity in Southwestern Virginia is relatively inexpensive demand-side management is less attractive; however, he believes there are still energy efficiency measures that are cost-effective. (Tr. 295; Tr. 293).
[26]Tr. 801, 802.
[27]Tr. 843.
[28]Tr. 2379.
[29]Tr. 1120.
[30]Tr. 848, 1069, 1237, 1672, 1779, 1780, 2299.
[31]Tr. 899, 1120.
[32]Tr. 574, 693, 1148.
[33]Tr. 2200.
[34]Tr. 502.

kayaking, canoeing, cross-country skiing, and rock climbing.[35] The Wolf Creek Indian Village and Museum is a cultural attraction located in Bland County. The reconstructed Indian village is near an archeological dig that in 1970 uncovered fire pits dating to the year 1215. The proposed corridor of the Wyoming-Jacksons Ferry route is located a short distance from this cultural and tourist attraction.[36]

George Simmons, a member of the faculty at Virginia Tech, explained that the New River is ancient and unique by any standards. It cuts through five mountain ranges in the Alleghenies and eventually drains into the Mississippi River. The New River is estimated to be a hundred million years old. Dr. Simmons emphasized that the New River should be recognized as one of the great natural wonders of the world.[37] He urged the Commission to consider the great antiquity of this region and its educational value. Portions of the New River in North Carolina and West Virginia have been designated by federal statute as the New River National Wild and Scenic River. The New River just north of the Virginia-West Virginia state line has been designated as a study area for protection as a national wild and scenic river.[38]

Michael Dawson described the New River from Whitethorne Landing in Montgomery County to Bluff City in Giles County as a large spectacular river with dramatic and constantly changing mountain vistas. There is very little visible development of any consequence. Most of the towns and villages along the river could be described as pastoral. The river alternates between long pools and long stretches of ledges and riffles. There are several good rapids. The river is generally very clear with a deep green color characteristic of limestone streams. Mr. Dawson described the fishing as excellent with over a dozen species of game fish common to this section of the river. AEP's Wyoming to Cloverdale route would impose extensive, intrusive and unmitigable views of the power line from the river according to Mr. Dawson.[39]

Bob Egbert, representing the Virginia Chapter of the Sierra Club, argued that the only people in favor of the proposed transmission line are the ones that have a financial interest in it. He pointed out that the people AEP proposes to serve with this transmission line do not want it. The Sierra Club is opposed to the construction of the proposed transmission line in any location.[40]

Connie Marshall, a member of Congressman Rick Boucher's staff, read a statement on behalf of Congressman Boucher. In his statement, Congressman Boucher noted that he submitted to the Commission a detailed request for the consideration of alternatives to the construction of the proposed transmission line. These alternatives include local generation, aggressive demand side management, purchased power, canceling existing power sales contracts, and building a smaller transmission line.[41] The letter requested the Commission to take a comprehensive approach in reviewing the suggested alternatives, both individually and in combination, to determine if less

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[35] Tr. 396.
[36] Tr. 1692.
[37] I rafted down the sections of the New River described by Dr. Simmons which are on the Wyoming-Cloverdale route, as well as the section of the New River that would be crossed by the Wyoming-Jacksons Ferry route. (Tr. 383).
[38] Tr. 1438.
[39] Tr. 869, 872, 873.
[40] Tr. 1937.
[41] Congressman Boucher's proposals are discussed in detail in this Report.

environmentally intrusive measures could produce a strategy for meeting Southwest Virginia's growing power needs without the necessity of constructing the new power line.[42]

Greg Kelly, a representative of Congressman Virgil Goode, read a statement on behalf of Congressman Goode. In his statement, Congressman Goode stated that he was distressed to learn of the Wyoming-Jacksons Ferry Alternative now being contemplated. Congressman Goode portrayed this new proposal as "nothing more than a half-baked idea to shift the line from a major portion of the 9th Congressional District to the 5th Congressional District." Congressman Goode concluded that his constituents along the Wyoming-Jacksons Ferry route will be even more angry than citizens living along the Wyoming-Cloverdale route.[43]

Senator Phillip Puckett[44] spoke in opposition to the proposed transmission line and requested that alternatives be explored in depth. Senator Puckett questioned whether Southwest Virginia has a need for the transmission line. In his opinion, there will be an abundance of power available as Virginia moves toward deregulation of the electric industry.[45] If the proposed transmission line is built, Senator Puckett questioned whether the power needs of Southwest Virginia would be solved or whether there would still be a problem.[46]

Delegate Tom Jackson portrayed the proposed transmission line as a short-term solution that would unnecessarily destroy the natural beauty of Southwest Virginia. Delegate Jackson expressed his belief that technology will, in a few short years, make 765 kV power lines unnecessary in the transmission of power.[47]

Larry Jay Williams, chairman of the Giles County Board of Supervisors, expressed concerns about the impact of the proposed transmission line on property values and the County's tax base. Mr. Williams urged consideration of alternatives set forth by Congressman Boucher.[48]

Harvey Atkinson, speaking on behalf of the Wythe County Board of Supervisors, emphasized the potential detrimental impact of the proposed transmission line on groundwater and other environmental systems and the impact on tourism in the area. In addition to these impacts, Mr. Atkinson pointed out the unknown effects of EMF radiating from the transmission line. Mr. Atkinson proposed more study of these potentially harmful impacts resulting from the proposed transmission line.[49]

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[42] Tr. 1651, 1652.
[43] Tr. 1594, 1595.
[44] Senator Puckett represents the 38th District, which includes Wythe County. (Tr. 2166).
[45] Tr. 2170.
[46] Tr. 1657.
[47] Tr. 2175.
[48] Tr. 1125, 1126.
[49] Tr. 2315

Joseph Gorman, chairman of the Montgomery County Board of Supervisors, stated that the Montgomery Board of Supervisors opposes the Wyoming-Cloverdale route through Montgomery County because the line would adversely impact the County's scenic, historical, recreational and sensitive environmental areas. Additionally, the Board advocates a study of alternatives to the proposed transmission line.[50]

Gerald Burgess, county administrator for Botetourt County, confirmed that Botetourt County has twice passed resolutions in support of AEP's Wyoming-Cloverdale 765 kV project. Mr. Burgess pointed out that Botetourt County is currently developing the largest business park in western Virginia, Botetourt Center at Greenfield. Reasonably priced and reliable electrical power is a critical issue in attracting industry.[51]

Daniel Cole, a certified flight instructor and a member of the Blue Ridge Soaring Society, opposed the transmission line as a hazard to soaring and aviation in general. Mr. Cole explained that gliding and soaring activities take place at low levels along mountain ridges.[52]

Witnesses expressed concerns regarding eminent domain and the impact on property values. In particular, many families live on land that has been passed down for generations.[53] Generations of the same family have farmed this land,[54] and the current owners plan to pass the land on to their children.[55] As Elizabeth Johnson explained, AEP cannot put a price on family land.[56] Al Baldwin, a Bland County farmer and real estate broker and appraiser, testified that the primary wealth of many families is invested in the family farm. He stated that a power line of the magnitude proposed by AEP would certainly have a negative effect on property values.[57] Rebecca Richardson opposed not only the sale of electricity to the east coast metropolitan areas, but also the abuse of eminent domain laws allowing condemnation of private land for corporate profit under the guise of supplying needed electricity to Southwest Virginia.[58]

Philip Kozminsky recently traveled from New York City up the Hudson River Valley. In the Hudson River Valley are nuclear, gas and oil-fired power plants that send their electricity directly into the New York metropolitan area. Yet, Mr. Kozminsky saw not a single 765 kV power line in the area. He questioned why Southwest Virginia needs two 765 kV transmission lines yet New York City needs none.[59]

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[50]Tr. 218, 219.
[51]Tr. 1323.
[52]Tr. 467.
[53]Tr. 314,1666, 1923.
[54]Tr. 400, 1158.
[55]Tr. 1668, 1733.
[56]Tr. 1809.
[57]Brenda Blankenship stated that AEP will pay for a 200-foot right-of-way through landowners' property, but the loss of value to the rest of the property would be substantial. (Tr. 1700, 1701). Shelia Collins would view the proposed transmission line from the front porch of her home. She and witness Rosemary Freeman questioned whether AEP officials would feel differently if they were forced to look at the huge towers from their own homes. (Tr. 1137, 1178, 1929).
[58]Tr. 1660.
[59]Tr. 2382.

Several speakers, primarily from municipal and business groups, spoke in favor of the Company's proposed transmission line.

John Anderson, former president and chief executive officer of Southside Electric Cooperative and Howard Scarboro, general manager of Central Virginia Electric Cooperative ("CVEC") support AEP's transmission proposal. Mr. Anderson stated that AEP's proposed transmission line will strengthen the total available power to the Commonwealth of Virginia. In addition, the proposed transmission line will give the Commonwealth access to economical savings from AEP that are not presently available in Virginia.[60] Mr. Scarboro stated that AEP is one of two principal wholesale power suppliers of electricity to CVEC. Although AEP has provided reliable and economical energy, there are future reliability concerns due to transmission constraints. In addition, Mr. Scarboro pointed out that the area served by the CVEC's AEP delivery points has recently embraced economic development as a means of providing jobs and broadening the tax base. Nelson County has a new business park and Appomattox County has recently begun to develop a 600-acre business park. Without the proposed transmission line, Mr. Scarboro stated that the electric service in these counties will be inadequate to attract industry.[61]

Richard Hudson, dean of finance and administration at Southwest Virginia Community College ("SVCC"), testified that the college is perhaps the largest consumer of electricity in Tazewell County and its electrical demand will continue to increase over the next decade. Mr. Hudson stated that the transmission line is needed because SVCC cannot afford power interruptions or a decrease in its electrical service; electricity is vital to SVCC and its future.[62]

Mark Meachum of Bluefield, West Virginia, stated that, from a business and economic development standpoint, reliable and affordable electric service is necessary to attract new industry and retain existing industry. He pointed out that new technology is constantly being developed and causes an ever increasing demand for electricity.[63]

Barbara Altizer, executive director of the Virginia Coal Council ("Council"), characterized the proposed transmission line as beneficial to the coal industry. Ms. Altizer pointed out that electric demand related to the growth of the Internet is currently responsible for 8% of the total electric consumption in the United States. The coal industry would benefit from the projected growth of technology-related electric energy consumption. Currently, 56% of the electricity generated in the United States is produced by coal-fired generation.[64] Emily Fisher, testifying in Pulaski on behalf of the Council, read a letter in support of the transmission project. The letter noted that Southwest Virginia needs reliable power fueled by coal for the future. Reliable, affordable power attracts new industry and jobs, thereby creating an improved tax base, better education, and an improved quality of life.[65]

[60]Tr. 1497.
[61]Tr. 1598.
[62]Tr. 2025.
[63]Tr. 184.
[64]Tr. 2145.
[65]Tr. 63.

Thomas Combiths, town manager of the Town of Pulaski, an industrial center in Southwest Virginia, explained that a reliable and economical source of electric energy is essential to maintaining the community's approximately 4,000 industrial jobs.[66] David Spangler, representing a small textile mill in Pulaski that employs 350 to 400 people, explained that the mill operates 24 hours a day, 360 days a year; any interruption in power is very costly to the company.[67] Representatives of numerous small and medium-sized businesses in Southwest Virginia expressed support for the proposed transmission line citing the importance of reliable electric service to their businesses.[68] Pulaski County officials and business leaders voiced support for the proposed transmission line. Pulaski County officials view the transmission line as necessary for continued growth and retention of current industry.[69]

Delegate L. Preston Bryant, Jr. of the 23rd District which includes most of the City of Lynchburg and part of Amherst County, spoke in support of the Wyoming-Cloverdale transmission project. Mr. Bryant pointed out that most of central Southside and western Virginia have received excellent electric service at a more than reasonable cost. Mr. Bryant described this inexpensive and reliable electric service as a powerful industrial recruiting tool.[70]

Duane Dahlquist, general manager of the Blue Ridge Power Agency[71] ("Blue Ridge"), stated that Blue Ridge actively supports construction of the proposed Wyoming-Cloverdale transmission line. All Blue Ridge members depend on the AEP transmission system for their electric supply. Pointing out that the manufacturing and computer-based industries of today require continuous and stable electric service, Mr. Dahlquist stated that delay of the AEP transmission project is compromising the economic future and well-being of member communities.[72]

Pete Crawford, vice president of Pulaski Furniture Corporation, testified that his company has a total of 2,250 employees. Mr. Crawford stated that although AEP provides reliable service, there have been some blackouts. He further pointed out that furniture manufacturing is a very competitive business and a blackout of any extended time would put them out of business. Mr. Crawford stated that adequate power is needed, not only for existing businesses, but also for future economic development.[73] Press Turbyfill, executive vice president of Vaughan Furniture Company

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[66]Tr. 133, 134.
[67]Tr. 150, 151.
[68]These witnesses include Terri Birkett of Stuart Flooring Corporation; Lendall Shields of Hubbell Lighting, Incorporated; and Mark Goff of Rapoca Energy Company.
[69]Hi Nicely, chairman of the economic development organization (Tr. 451); Joe Morgan, county administrator (Tr. 453); and Peter Huber, assistant county administrator for Pulaski County, pointed out that just the threat of electrical fluctuations, much less outages, will cause certain types of businesses to look or expand elsewhere. Mr. Huber notes that about 95% of Pulaski County's 33,000 residents are dependent on nonagricultural activities. (Tr. 590, 591).
[70]Tr. 1549.
[71]Blue Ridge Power Agency ("Blue Ridge") is a joint action agency that assists its members with wholesale power supply needs and seeks to protect their interests in appropriate forums. The members include municipal electric systems of the Cities of Bristol, Bedford, Martinsville, Danville, Radford, Salem, and the Town of Richlands. In total, Blue Ridge members serve approximately 85,000 retail meters representing 200,000 citizens in Virginia. Blue Ridge members' load is approximately 500 megawatts. (Tr. 1553).
[72]Tr. 1555.
[73]Tr. 581, 582.

which has 1500 employees in the Galax area, confirmed that the furniture industry greatly relies on a constant power source at competitive rates.[74]

Steve Wachnowsky, speaking on behalf of the Celanese Acetate plant located near Narrows, Virginia, pointed out that the most recent upgrade of transmission capacity in Southwest Virginia was made in 1973. Since that time, the load on the transmission system has increased by 136%. Mr. Wachnowsky concluded that the case for additional transmission capacity to meet the current and future electric service needs of the New River Valley is clear, urgent and compelling.[75]

Ron Bierman, assistant vice president of manufacturing for Volvo Trucks North America, stated that his company employs approximately 2,400 people at its assembly plant in Dublin, Virginia. Additionally, this plant supports eight other companies in the area that provide about $20 million in payroll. In 1995, Volvo spent $200 million to expand the Dublin plant which resulted in a 50% increase in employment. Mr. Bierman emphasized that one of the factors Volvo considered before locating here and investing in the Dublin plant was the low cost reliable energy provided by AEP.[76]

Representatives of Goodyear Tire and Rubber Company and Dan River, Inc., both in Danville; Greif Brothers Corporation, Virginia Fibre Mill in Amherst; and Roanoke Electric Steel in Roanoke testified that their plants operate around the clock and that any interruption in their electric service is very costly.[77]

Elizabeth Doughty, representing the Board of Directors of the Roanoke Valley Economic Development Partnership, presented a resolution in favor of the Wyoming-Cloverdale transmission project. Ms. Doughty stated that electricity costs and reliability are ranked as key factors by industry in determining plant sites. Ms. Doughty pointed out that energy costs are higher in neighboring regions giving the Roanoke Valley a competitive edge in attracting new industry.[78]

David Bowers, mayor of Roanoke, spoke in support of the Wyoming-Cloverdale transmission project, and pointed out that demand for electricity has increased in the Roanoke metropolitan area by 127 percent since 1970. Peak demand has more than doubled in the area since the last major transmission line was built in 1973. Demand is projected to triple by 2002, the earliest year the transmission line can be built. Mr. Bowers emphasized that this transmission project is essential to the future economic growth and prosperity of the Roanoke metropolitan area.[79]

William Rolfe, county administrator of Bedford County, stated that the Bedford County Board of Supervisors supports the proposed transmission line. Mr. Rolfe explained that Bedford County has experienced an annual three percent growth in population since 1970. Bedford County

[74]Tr. 583.
[75]Tr. 807.
[76]Tr. 808, 809.
[77]Tr. 1474, 1559, 1560, 1562.
[78]Tr. 1325.
[79]Tr. 1333.

has approximately 1,000 new housing units built per year and has experienced tremendous success in economic development, a success that is dependant on reliable electricity at a fair cost.[80]

Benny Sommerlin, deputy county administrator for Henry County, stated that the Henry County Board of Supervisors is aware of the need for a reliable system of electrical distribution and supports AEP's proposed Wyoming-Cloverdale transmission project.[81]

Local Chambers of Commerce support the proposed transmission line.[82] Larry Aydlett, executive vice president of the Martinsville-Henry County Chamber of Commerce, endorsed the proposed Wyoming-Cloverdale transmission project and urged its rapid construction. Mr. Aydlett stated that his area has experienced the exodus of some industry. Economical and reliable energy is necessary to retain existing industry and attract new jobs.[83]

Daniel LeBlanc, president of the Virginia State AFL-CIO, stated that his organization supports the AEP transmission project because it is about good jobs, which is good for Virginia.[84]

Gregory Gore, a representative of the International Brotherhood of Electrical Workers ("IBEW"), stated that the IBEW supports the proposed transmission line. Mr. Gore emphasized that a reliable electrical infrastructure draws industry to an area and is vital to economic growth. Mr. Gore stated that the Wyoming to Cloverdale transmission project will provide nearly 200 construction jobs to members of the IBEW.[85]

D. R. Sizemore, representing the Virginia State Building and Construction Trades Council AFL-CIO, stated that his organization supports the proposed AEP transmission project as necessary for economic and job growth in Virginia.[86]

Dr. Edward Barnes spoke in favor of a balanced perspective. He emphasized that the beauty of the region needs to be protected; however, he noted that the region's electric power delivery system has not been upgraded since 1973. Dr. Barnes also emphasized that steps need to be taken to ensure that electric power is available to support the economic development of the region. Dr. Barnes strongly believes that reliable electric service can be achieved and, at the same time, the environmental impact on the region can be minimized.[87]

NEED

Any discussion of need for the proposed transmission line should be preceded by an overview of the AEP system and how it functions. The Company is one of eleven operating subsidiaries of AEP, a multi-state public utility holding company. The AEP system is planned and

[80]Tr. 1392.
[81]Tr. 1622.
[82]Tr. 1404, 2032.
[83]Tr. 1350-1352.
[84]Tr. 1602.
[85]Tr. 1482.
[86]Tr. 1571.
[87]Tr. 1966-1971.

operated as an integrated system. The generation facilities on the AEP system are sufficient to meet current load requirements for the AEP operating companies through 2004;[88] however, the bulk of AEP system generation is located in the Ohio River Valley. Southwest Virginia has relatively little generating capacity and must, therefore, rely on the transmission of power from the AEP generating units located primarily in the Midwest.[89]

Peak customer load on the AEP system in Southwest Virginia exceeded the capacity available from local area generating resources by almost 1,700 MW in the winter of 1998/1999. Total generation in the region is 1,061 MW[90] while the peak load was 2,750 MW for this period. The shortage is expected to increase to over 2,500 MW by the winter of 2002/2003 as the peak load grows to a forecasted 3,574 MW.[91] As the demand for electricity in Southwest Virginia continues to grow,[92] there is increased reliance on imported power, which is delivered on the AEP transmission network.

The last addition to the backbone of the transmission network, the Baker-Broadford-Jacksons Ferry-Cloverdale 765 kV line, was completed in 1973.[93] No additional backbone transmission lines into Southwest Virginia have been constructed since that time.[94] The demand for electricity by customers served by this transmission network in the Central/Eastern APCo area has increased by 136% since 1973.[95] This demand is forecasted to continue growing at an average rate of 2.2% per year into the foreseeable future.

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[88]Tr. 2702, 2714.

[89]A map of the AEP transmission system and location of the generating units is attached as Appendix B to this Report. The most important interconnections into Southwest Virginia are the Baker-Broadford-Jacksons Ferry 765 kV line, the Kanawha River-Matt Funk 345 kV line, and three 138 kV lines.

[90]As discussed later in this Report, this amount of total generation may be misleading because the Smith Mountain hydro facility would not be available at its full rated capacity of 548 MW. Staff consultant Palermo, at page 53 of the KEMA report, places the amount of installed generation in the AEP-Virginia region at 453 MW. This includes Glen Lyn (coal) at 338 MW, Claytor (hydro) at 75 MW, and Leesville (hydro) at 40 MW. As with the Smith Mountain facility, hydro facilities are subject to flood control and water release restrictions and may not be available at full capacity when needed.

[91]Ex. No. PJP-13, Report at 5.

[92]These figures reflect demand placed on the system by the Company's connected load customers. Connected load customers are directly connected to the transmission or distribution facilities of the Company, regardless of the provider of generation. Under applicable state and federal laws, the Company has an obligation to provide electric transmission and distribution service to these connected load customers.

[93]There are two 765 kV lines, one 345 kV line and six 138 kV lines which serve the Central/Eastern APCo areas. The Baker-Broadford-Jacksons Ferry-Cloverdale line is the only 765 kV that can provide electric power directly to the entire Central Eastern APCo areas. The second 765 kV line, known as the Culloden-Wyoming line originates in Putnam County, West Virginia and ends approximately 58 miles away at the Wyoming Station in Wyoming County, West Virginia. The transmission lines proposed in this case would be an extension of the Culloden-Wyoming transmission line into Virginia.

[94]The Cloverdale-Joshua Falls 765 kV transmission line was completed in 1979 and the Axton-Jacksons Ferry 765 kV transmission line was completed in 1985-86. These transmission lines are radial extensions and are not a part of the backbone network. (Tr. 2732).

[95]During the winter of 1972/73, the Central/Eastern APCo area experienced a peak demand of 2720 MW. By the winter of 1995/96, the peak demand for the Central/Eastern APCo area was 6425 MW. The forecasted demand for the winter of 2002/03 is 7686 MW. (Ex. No. BMP-7, Direct Testimony at 8, 9).

To evaluate the need for the proposed transmission line, Commission Staff hired the firm of KEMA Consulting, Incorporated ("KEMA" or "Staff consultants"). Jeffrey Palermo, an executive consultant with KEMA, testified there is a clear need for some action to be taken because the existing transmission system in the region does not meet reliability criteria. The most critically overloaded transmission line is the Kanawha River-Matt Funk 345 kV line. [96] Mr. Palermo explained that their evaluation included transmission remedies, generation remedies and several other alternatives. They concluded that the two practical, viable solutions were either the Wyoming-Cloverdale or the Wyoming-Jacksons Ferry 765 kV transmission projects outlined in this proceeding. [97]

The KEMA Report concludes that the current electrical system in Southwest Virginia does not meet accepted national and regional electric power reliability standards. [98] This means that customers in Southwest Virginia face an unacceptably high risk of interruptions in electric service, a situation that will become significantly worse in the coming years. Mr. Palermo confirmed that APCo's concerns of brownouts and blackouts if a transmission project is not approved are valid. [99]

Simulated contingency studies performed by the Company include projections of future peak demand for electricity by the Company's connected load customers. [100] These forecasts use econometric time-series models to project the effects of major economic and demographic variables on the peak demand and energy consumption of the Company's connected load customers. These variables include regional and national economic and demographic conditions, energy prices, weather factors and specific information such as the known plans of major customers.

Staff witness Stavrou reviewed the Company's forecasting methodologies and determined them to be sound and appropriate. In particular, Mr. Stavrou testified that the Company's forecasts of peak demand since the late 1980s have generally tracked the actual peaks notwithstanding annual peak demand fluctuations due to weather fluctuations. [101]

Protestants' witness Blecker performed an analysis of the need for the proposed transmission line and concluded it is not appropriate and would be a poor investment for Virginia ratepayers. Mr. Blecker maintained that stress on the AEP transmission system is driven as much, if not more, by the transmission of power across the AEP system for third parties than it is by load

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[96] For example, the double contingency of an overlapping outage of the Baker-Broadford 765 kV line and the Pruntytown-Mt. Storm 500 kV line result in an overload of the Matt Funk 345 kV line of 131% of its emergency thermal rating. This loading level far exceeds the allowable limit set in AEP's planning criteria and is not acceptable by standard engineering design practices. (Ex. No. PHP-13, Report at 13).

[97] Tr. 2839, 2840.

[98] The AEP System's planning criteria are derived from the NERC Planning Principles and Guides and ECAR Document No. 1, "Reliability Criteria for Evaluation and Simulated Testing of the ECAR Bulk Power Supply Systems." (Ex. No. BMP-7, Rebuttal Testimony at 7). As a member of ECAR, AEP is required to apply the ECAR criteria in evaluating the reliability of its existing system and in formulating plans for reinforcing that system. (Company Brief at 8).

[99] Tr. 2857. Mr. Palermo stated that he was "amazed" and "shocked" at the current situation regarding the transmission grid. (Tr. 2858).

[100] Connected load customers are those customers directly connected to the Company's transmission or distribution system, regardless of the provider of generation resources. Under state and federal law the Company is obligated to provide transmission and/or distribution service to these customers.

[101] Ex. No. JS-5, at 12, 13.

growth. The Company, according to Mr. Blecker, has not presented an adequate case to rule out an upgrade of the Kanawha River-Matt Funk 345 kV transmission line. Further, Mr. Blecker stated that deregulation of the electric power industry, plans for new generation, and distributed generation technology may significantly reduce the need for new transmission to support APCo's claimed load growth.[102]

Mr. Blecker's analysis, however, overstates the Company's wheeling sales and understates the Company's connected load. The Company's analysis forming the basis for establishing need for the transmission line includes only connected loads, which the Company is obligated to serve, and does not include firm wheeling transactions.[103] In fact, the Company has accepted no firm, long-term wheeling requests since 1991 because of system reliability concerns. In May of 1997, the Company posted notice on its Open Access Same-Time Information System that no long-term firm power sales would be permitted through the Central/Eastern APCo area because of constraints in the AEP southern transmission region.[104]

Mr. Blecker further charged that the Company did not analyze the effect of proposed capacity additions in nearby regions. Mr. Blecker overlooks the fact that just because generation facilities are planned, they may not actually be installed. Further, until the proposed generation is specifically located, it is impossible to determine its effect on the transmission network. As will be discussed later in this Report, generation facilities would have to be precisely located and dispatched to relieve transmission overload. If the generation is located to the west of Southwest Virginia, the problem of transmission overload will only be exacerbated, as load flows from west to east would increase.

Mr. Blecker also alleged the Company did not account for projected Company generation in its analysis. The AEP updated generating capacity plan shows the need for 2,900 MW of additional generating capacity for the AEP system in the 2003-2009 period. As discussed below, the potential for significant capacity additions in Southwest Virginia is limited. Also, as noted in the discussion below, substituting generation for the proposed transmission line raises environmental and cost concerns.

Mr. Blecker further stated that the Company should have included the generation provided by the Smith Mountain hydro facility[105] in modeling its available generation resources. Smith Mountain is a pumped storage hydro facility that can, under optimum conditions, generate approximately 565 MW; however, its pumping capability is only 300 MW.[106] This means that it takes longer to pump the water back into the reservoir than it does to run it through the generating units. During periods of peak demand, power may not be available to pump water back into the reservoir. Further, the Smith Mountain facility is subject to flood control and water release restrictions that could further restrict its operation. The Company determined that the facility could

[102]Tr. 2865-2867.
[103]Tr. 3027-28; Ex. No. MDA-4, Rebuttal Testimony at 6.
[104]Ex. No. BMP-7, Rebuttal Testimony at 16, 17.
[105]Tr. 2883.
[106]Smith Mountain operates on a weekly cycle. Water runs through the generating units during the day when demand is high and is pumped back into the reservoir at night when demand is low. Because the pumping capacity is less than the generating capacity, there is less and less water available for generation as the cycle progresses. There have been occasions when late in the cycle the Company had virtually no generation capacity. (Tr. 3043, 3044).

reliably provide 0 to 200 MW. This amount of generation is insufficient to offset the need for transmission relief during periods of peak demand.

ALTERNATIVES

Generation

Staff consultant Palermo testified that, in the Company's original study of a generation alternative, the conclusions were presented in such a way that exaggerated the amount of generation needed during the initial years of the study period. Specifically, the Company's study identified the generation needed to equal the benefit of the proposed 765 kV transmission line. Mr. Palermo stated that it would have been more appropriate to determine the generation required to meet the reliability requirements of APCo on a yearly basis.[107] While this would eventually result in approximately the same amount of generation, the total amount of generation would not be required until at least a decade after the first unit went into service.[108]

Overall, Mr. Palermo concluded that eight 170 MW combustion turbines (1360 MW) would be required to meet the needs of APCo in the winter of 2003/04.[109] An additional 170 MW of new generation would be needed each year thereafter to provide for load growth in the region.[110]

If generation were to be used to relieve stress on the transmission system, the location of the generation would be critical. According to Staff's analysis, at least 1,140 MW of generation would have to be located at the Matt Funk 345 kV station. The following table depicts the minimum additional generation required at various alternative sites to control loading of the Kanawha River-Matt Funk 345 kV transmission line under year 2003/04 winter peak load conditions.[111]

[107] Ex. No. PJP-13, Report at 47.
[108] Another difference in Mr. Palermo's analysis and that of the Company's is that Mr. Palermo sought to determine the amount of new generation that would be required to reduce the contingency loading on critical transmission facilities to 100% of its capacity rating while the Company used a criterion of 90%. The Company states that a criterion of 90% is necessary because when 90% of a transmission line's capacity is reached, the Company must begin to take measures to relieve line loads. (Ex. No. BMP-7, Rebuttal Testimony at 31).
[109] This is a conservative estimate of the minimum amount of new generation required to mitigate transmission overloads. (Ex. No. PJP-13, Report at 53).
[110] Id.
[111] Id. at 50.

Minimum Additional Generation Required at Various Alternative Sites To Control Loading on the Kanawha River-Matt Funk 345 kV Line* (2003/04 Winter Peak Load Conditions)

Alternative Generation Site	2003/04 Generation Needed		Subsequent Generation Needed
	(Dispatched) (MW)	(Installed)** (MW)	(Installed)** for Each 100 MW AEP-Virginia Load Growth after 2003/04 (MW)
Matt Funk 345 kV	1,140	1,200	34
Matt Funk 138 kV	1,300	1,360	65
Cloverdale 345 kV	1,410	1,480	97
Cloverdale 138 kV	1,390	1,460	99
Joshua Falls 765 kV	1,490	1,560	145
Joshua Falls 138 kV	1,500	1,570	149
Axton 765 kV or Jacksons Ferry 765 kV	1,580	1,660	190
Axton 138 kV or Jacksons Ferry 138 kV	1,580	1,660	196

NOTES:
*For the outage of Baker-Broadford 765 kV and Pruntytown-Mount Storm 500 kV lines
**Including reserve margin based on 95% gas-fired generating unit availability to simplify these calculations

The least cost generation solution would include the addition of approximately 1,200 MW of gas-fired combustion turbines ("CT") at the Matt Funk 345 kV bus. However, limited gas supply to the Matt Funk location would only support about 600 MW of CT generation. Furthermore, AEP-Virginia experiences its peak demand in the winter months, a period when demand for gas is also at its peak. Therefore, it is questionable whether firm gas supplies would be available when needed.[112]

Staff conservatively estimates the total cost for the generation facilities alone would be approximately $460 million for the 2003/04 period. As noted, additional generation would have to be installed annually. To support the additional generation, local transmission facilities would require reinforcement at an estimated cost of $35 million. Annual operating costs of the new generating facilities are estimated to be $107 million.[113] The initial capital cost of the least cost generation option is approximately twice the capital cost of a 765 kV transmission line.[114] Additional capital investment of approximately $58 million (one 170 MW CT) each year would be necessary under the generation alternative to provide for future load growth.

[112]Ex. No. BMP-7, Supplemental Direct Testimony at 16.
[113]Id.
[114]The Company contends the total capital cost of the minimum amount of least cost generation would be about $698 million, or about two and a half times that of the Wyoming-Cloverdale line and about three times the cost of the Wyoming-Jacksons Ferry project. In addition, the Company projects approximately $50 million to $100 million of annual capital investment each year after 2003/04 for additional generation needed to keep pace with future load growth. (Ex. No. BMP-7, Second Supplemental Direct Testimony at 9).

Staff considered another generation option, gas-fired combined cycle generation. Combined cycle ("CC") units are about 35% more efficient than simple cycle CTs. The initial capital investment, however, is about 45% greater for the same amount of CT capacity. Also, CC units require large amounts of water and there are relatively few acceptable sites in Southwest Virginia.[115] The CC units would need to be dispatched for more than 1,700 hours a year to provide an economical solution. The economics of the overall AEP system will not justify this level of operation, therefore I find that Staff consultants and the Company have appropriately ruled out CC units as a justifiable option.

Coal-fired generation as an alternative for a 765 kV transmission line in Southwest Virginia is simply not a viable option. First, the minimum costs for coal-fired generation to meet the 2003/04 winter peak would be $1.9 billion for the generation facility alone, or about seven times the cost of the 765 kV line. Second, if a suitable site with sufficient water could be found,[116] new coal generating units could not be completed before 2010. Finally, coal-fired generation units could have a major environmental impact, primarily with water requirements and increased air pollution.

While the Company and Staff differ somewhat in their analyses of a generation alternative to a 765 kV transmission line, they both reach the same conclusion: Generation is not a suitable alternative to the construction of a new 765 kV transmission line. Not only would generation be far more expensive to construct than either of the Company's two proposed transmission alternatives, it would in come cases also involve the additional cost of constructing new transmission facilities necessary to integrate the new generating units into the transmission grid, as well as higher operating costs. Additional costs may be incurred because, to relieve transmission line loads, generation would need to be located in an area that might not be the most cost-effective site for new generation. Generation facilities would also cause significant environmental impacts in the form of combustion emissions, water requirements, extension of fuel pipelines and transmission facilities. Most important, however, generation would fail to provide an acceptable solution to the problem of transmission constraints identified in this case because it does not afford the rapid, automatic response needed to deal with transmission emergencies. Finally, with the advent of electric deregulation, there is no assurance that AEP will build additional generation. Accordingly, I find that new generation would not provide a practical, cost-effective alternative to the proposed transmission projects.

[115]The primary sources of water in Southwest Virginia are scenic and recreational areas such as the New River and Claytor Lake.

[116]In 1991, the consulting firm of Sargent & Lundy conducted a study to evaluate siting options for new coal-fired power stations in southwestern Virginia. The study area included all 31 counties in southwestern Virginia, including Roanoke and Botetourt. Of the possible sites evaluated, none were in the Roanoke area where generation would be needed to alleviate transmission line loads. Two sites that would support 800 MW units are located in Wythe County near the New River. Construction of coal-fired generation in southwestern Virginia would involve additional costs (estimated at $150 million) for dedicated bulk transmission facilities to integrate the generation into the network in the Roanoke area. If the new generation load were connected to the transmission system at Jacksons Ferry Station, the Sargent & Lundy study concludes that total new generation of approximately 2550 MW would be required in order to eliminate transmission overloads. The cost of this additional generation alone would be approximately $1.9 billion. (Ex. No. BMP-7, Supplemental Direct Testimony at 23-25).

Other 765 kV Transmission Alternatives

In addition to testimony pertaining to the Jacksons Ferry Alternative, the Company filed supplemental direct testimony on two additional 765 kV alternatives to the proposed Wyoming-Cloverdale 765 kV transmission line. These two alternatives involved 765 kV lines from Wyoming to Lurich, coupled with extensive upgrades of existing 138 kV transmission lines from Glen Lyn to Roanoke area load centers and a 765 kV line from Amos to Cloverdale. A comparison of the effect on the Kanawha River-Matt Funk line at maximum contingency loading for all four 765 kV projects is provided below.[117] This table reflects the effect of each project on the Matt Funk line under the worst contingency conditions.

Comparison of 765 kV Alternative Projects

765 kV Alternative	Total Project Cost (2002 $ M)	Kanawha River-Matt Funk 345 kV Circuit	
		Maximum Contingency Loading (% of Capability)	Capability Margin (%)
Wyoming-Cloverdale	$263M	79%	21%
Wyoming-Jacksons Ferry	$223M	91%	9%
Wyoming-Lurich	$348M	97%	3%
Amos-Cloverdale	$335M	74%	26%

The Wyoming to Lurich project would include:

1. Construction of a new 765 kV line to the Lurich site adjacent to AEP's Glen Lyn power plant in Narrows, Virginia;

2. Construction of a new 765/138 kV substation at Lurich;

3. Extensive upgrading of approximately 130 miles of double-circuit 138 kV transmission facilities on two corridors between Glen Lyn and the Roanoke area;

4. Modification of numerous existing 138 kV step down transformers; and

5. Addition of a 1500 MVA 765/500 kV transformer at Cloverdale.

The Wyoming to Lurich project would cost $80 million more than the Wyoming to Cloverdale project and $125 million more than the Wyoming to Jacksons Ferry project. Further, the Wyoming to Lurich project would not reduce the contingency overload of the Matt Funk 345 kV transmission line to the same degree as would the Wyoming to Jacksons Ferry project or the Wyoming to Cloverdale project, both of which cost less.[118]

[117] Ex. No. PJP-13, Report at 45.
[118] Id.

The Amos to Cloverdale 765 kV transmission alternative would provide the best solution to relieving the contingency loading on the Matt Funk transmission line.[119] However, the Amos to Cloverdale transmission line would be approximately 145 to 160 miles in length and cost approximately $335 million. This would exceed the cost of the Wyoming to Cloverdale project by over $70 million and the cost of the Wyoming to Jacksons Ferry project by more than $100 million. Also, the direct path of this line would cross an environmentally sensitive area of the New River.[120]

I find that neither the Wyoming to Lurich nor the Amos to Cloverdale options provide a practical alternative to the Wyoming to Cloverdale or Jacksons Ferry projects primarily because of the significantly higher cost involved.

Build a Second 345 kV Circuit

The Matt Funk 345 kV transmission line is extremely critical to the reliability of electric power supply in Southwest Virginia. As noted, the Matt Funk line is also the most susceptible to overload in the case of a single or double contingency outage.[121] In fact, the Matt Funk is so critical that taking the line out of service for construction of a double circuit would create unacceptable reliability risks to customers in Southwest Virginia and to the regional transmission grid. Building a second circuit would require the line to be out of service for a year. While the cost per mile of a 345 kV line is comparable to the cost of a 765 kV line,[122] the transfer capability would only be one-half that of a 765 kV line. Even if the Matt Funk line could be rebuilt, it would delay the need for additional transmission reinforcement for only one or two years.[123]

Upgrading the Matt Funk line from Kanawha River to Cloverdale to a 500 kV line would be more expensive than either of the 345 kV alternatives. The entire length of the right-of-way would have to be widened by 25 feet. Further, it would require the addition of a 500/345 kV transformer at the Kanawha River Station or a 765/500 kV transformer at the Amos Station.[124] This upgrade would also involve the long-term outage of the Matt Funk, creating unacceptable reliability conditions on the regional transmission network.

The Matt Funk line is 127 miles long and crosses extremely sensitive environmental areas including the New River and the Appalachian Trail. Mike Dawson, the Appalachian Trail Club's regional representative for Southwest and Central Virginia, stated that an upgrade of the Matt Funk would be an "unmitigated disaster" for the Appalachian Trail. Mr. Dawson pointed out that the

[119]The Amos to Cloverdale 765 kV option would provide a 26% margin of relief on Matt Funk contingency overloads. (Ex. No. PJP-13, Report at 46).
[120]Ex. No. PJP-13, Report at 46.
[121]Contingency load of the Matt Funk line exceeded 90% of capability during 18 of 22 summer and winter periods from the summer of 1986 to the winter of 1996/97. In the summer of 1993, contingency loading of the line exceeded 90% of capability on 75% of the non-holiday weekdays during that period. (Ex. No. BMP-7, Vol. II, Response to Section I of Guidelines, at IV-6).
[122]The Company estimates the cost of rebuilding the 345 kV to a double circuit would be $285 million, while the cost of building a second parallel 345 kV single circuit line would be $231 million. (Ex. No. BMP-7, Rebuttal Testimony at 27).
[123]Tr. 2843.
[124]Ex. No. BMP-7, Rebuttal Testimony at 29.

Matt Funk line crosses that Appalachian Trail seven times and parallels the Trail for sixty to seventy miles.[125]

Staff pointed out that a combination of a second Matt Funk 345 kV circuit with 680 MW of new generation at the Matt Funk Station would provide enough capacity to meet the needs of the APCo region through the winter of 2008/09. However, as noted, the environmental impact of a second Matt Funk circuit would be significant and the cost of the necessary additional generation would also be significant. The use of generation to control the loading on the Matt Funk 345 kV line also would require the intervention of system operators to re-dispatch generation from power plants located upstream and downstream of the critical circuit. As Staff witness Walker pointed out, this could result in out-of-merit dispatch of generating units,[126] adding further to the cost of a generation alternative.[127]

An upgrade of the existing Matt Funk 345 kV line with either a second parallel line or a double circuit, would not be a practical or a good alternative. First, this line is so critical to the reliability of electric service in Southwest Virginia, it would be imprudent to take it out of service for the time necessary to perform the upgrade. Second, even with an upgrade, the increased transfer capability would not provide an adequate solution to the problem. Third, the environmental impact would be so severe that it would be improbable at best that necessary federal permits could be obtained. The fact remains that a 765 kV option provides far greater improvement in transfer capability and would meet the needs of the region for many more years than any 345 kV option.

Conversion or upgrade of existing 138 kV facilities or corridors

Possibilities for enhancing the 138 kV system include upgrading the conductors on selected 138 kV lines, converting existing single circuit 138 kV lines to double circuit lines, and upgrading existing 138 kV lines to a higher voltage. Upgrading existing 138 kV lines by installing new conductors or converting to a higher voltage line would involve expanding the existing right-of-way and installing taller towers. In most cases, there is little or no room to expand the existing rights-of-way because of adjacent urban and suburban development. Further, the cost of making these upgrades is similar to the cost of constructing a new 765 kV line and the resulting transfer capability is much smaller than that achieved with the addition of a new 765 kV line. Most of the existing 138 kV lines are already double circuit lines, therefore upgrading the remaining single circuit 138 kV lines to a double circuit would provide minimal relief. Finally, in view of the existing stress on the AEP transmission system, taking any transmission lines out of service for the extended periods necessary for upgrade construction would place unacceptable reliability conditions on the transmission system.[128] Therefore, I find that conversion or upgrade of existing 138 kV facilities is not a viable or practical option to constructing a new 765 kV transmission line.

[125]Tr. 3555.
[126]Generating units are dispatched, or brought on-line, on a cost-effective basis. An out-of-merit dispatch means that a generating unit would be dispatched when it was not economically efficient to do so.
[127]Ex. No. CDW-6, at 4.
[128]Ex. No. PJP-13, Report at 40.

New Transmission Technology

In his report, Staff consultant Palermo considered potential use of new transmission technology. The Flexible AC Transmission System ("FACTS") is a class of devices that uses high power electronic controls to affect the electrical characteristics of transmission circuits. FACTS devices can be used to shift power away from an overused circuit or to shift power to an underused circuit. However, FACTS technology cannot be applied to the AEP eastern region transmission system in Southwest Virginia because there are virtually no underused transmission circuits on the system. The relatively little spare capacity would mean that FACTS devices would have to be spread over virtually all transmission facilities in the area. The cost involved[129] would be greater than the cost of constructing a new 765 kV transmission line and would contribute only 450 to 500 MW of additional transfer capability to the region. With load growth in AEP's Central/Eastern region averaging about 157 MW per year, installation of this technology would represent only about three or four years of relief.[130] I find, based on the above information, that FACTS technology would neither be cost-effective nor provide relief sufficient to replace the need for a new 765 kV transmission line.

The Company explored the use of Unified Power Flow Controller ("UPFC") technology on existing 138 kV and 345 kV lines. UPFCs are power electronic devices that can adjust power flows and voltages more evenly over the transmission system. As noted above, the problem with this approach is that the critical lines are at or near their thermal limits during contingencies. While this technology can adjust the power flow, it cannot increase thermal capability. The AEP transmission network does not have sufficient thermal capability to meet its growing demand. Further, the Company has already installed conventional devices designed to optimize the distribution of power flows.[131]

Demand Side Management

Company witness Adams testified that planned and projected demand side management ("DSM") activities for the region have the potential to reduce the Central/Eastern APCo forecasted winter peak connected demand for 2002/03 by 36 MW.[132] Staff witness Stavrou and Staff consultant Palermo also explored the potential of DSM as an alternative to building a transmission line. Mr. Stavrou concluded that the maximum market potential peak reduction through DSM efforts is 249 MW for the winter of 2002/03. However, the cost of this DSM reduction would be $282 million, roughly the equivalent of constructing the Wyoming-Cloverdale project.[133] Mr. Palermo also concluded that 250 MW of DSM reduction was possible at approximately the cost of a new transmission line.[134] In addition to being neither sufficient nor cost-effective, the estimated DSM load reductions would not be constant across the load curve because there is no guarantee that the estimated DSM load reductions would occur coincident with the system peak. Clearly, additional DSM programs are not a viable alternative to a new transmission line.

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[129]FACTS terminal devices typically cost about $100/kVA and must be built for the full rating desired. Staff consultants estimate this cost would be about $470 million. (Ex. No. PJP-13, Report at 42).
[130]Ex. No. PJP-13, Report at 42-44.
[131]Ex. No. BMP-7, Direct Testimony at 23.
[132]Ex. No. MDA-4, Direct Testimony at 7.
[133]Ex. No. JS-5, at 15, 16.
[134]Ex. No. PJP-13, Report at 55, 56.

Purchased Power

Mr. Blecker testified that power could be purchased from independent power producers ("IPPs") as an alternative to building a transmission line. Most IPP projects involve CTs, which are easier to develop and less expensive to install than base load units. These projects are generally developed to sell power on the spot market and may or may not be available when needed to relieve transmission constraints. The Company would have to enter into "must run" contracts with the IPPs to assure their availability when transmission constraints occur. In short, the Company would be required to pay for the entire capacity cost of the unit in order to retain the right to dispatch the IPP generation when needed. Depending on the location of the generating unit, this option would provide marginal relief at best and be far more expensive than a 765 kV transmission line.

Mr. Blecker further argued the Company did not include purchased power from neighboring utilities as at least a partial solution to the transmission situation. According to Staff consultant Palermo, 4,000 to 17,000 MW of purchased power from neighboring utilities would be required for both loading relief and voltage support. While power may be available for purchase in a deregulated market, neighboring utilities are expected to become net importers of power in the future.[135] Also, the price of purchased power in a deregulated market at the time it is needed could be very expensive. Typically, periods of transmission stress occur at times of peak demand and transmission lines in the entire region are affected. Therefore, transmission capacity to move the purchased power to the location it is needed may not be available.

Further, because of the effects of parallel path flows and the need for local voltage support, the source of the purchased power would be critical. While this parallel flow effect would be less stressful for generation located to the south and east than for generation to the north and west, it will still increase loading on critical transmission facilities. As with the generation alternative, the location and dispatch of power is critical to alleviating transmission stress.

Mr. Palermo concluded that purchased power could supplement transmission or generation additions; however, purchased power could not provide a solution for transmission loading and voltage problems in the Company's Virginia service territory.[136] I agree. For the reasons stated above, I find that the purchased power option is not a viable solution to the problem of transmission constraints in Southwest Virginia.

Additional Proposals by Protestants

Mr. Becker also asserted that the Company failed to investigate the benefits of portable and on-site generation. Mr. Becker pointed out that small diesels, micro turbines and even CTs located in industrial centers reduce stress on the system, increase reliability, decrease line losses, and increase customer satisfaction.[137] Distributed generation is not a new concept. In fact, the Commission has a diesel generator on-site for use during power outages. Distributed generation, while helpful during times of emergency, neither improves nor provides reliability to an electrical system. Distributed generation has limitations. First, the small generating units would be privately

[135]Ex. No. PJP-13, Report at 56.
[136]Id.
[137]Tr. 2892.

owned and operated. The Company would have little or no control over their dispatch, which could create system control and planning problems. Second, because of their small size, it would take large numbers of the units to make a difference in demand during peak periods. Finally, at present, it is the Company's responsibility to construct adequate infrastructure to meet peak demand in its service territory.

Conclusion

I find there is a critical need for enhancement of the transmission system in AEP's Southwest Virginia service territory and that construction of a 765 kV transmission line is the best solution. Based on the evidence in this case, I find that there is no viable, cost-effective alternative or combination of alternatives. Independent analysis of the current situation clearly proves the existing transmission network is seriously overloaded and does not meet industry standards for reliability. By 2004, the earliest date the proposed transmission reinforcement can be implemented, total demand in the area will have grown to nearly three times the demand that existed in 1973, when the last major transmission reinforcement was made to the system. The fact that power flow studies show thirty-two different contingencies that violate the single or double contingency criteria[138] constitutes clear and compelling evidence that the current situation is critical and must be addressed promptly.

The lack of reliable transmission facilities could have a severe negative effect on the regional economy. Existing industrial and commercial customers could be dissuaded from expanding their operations; some existing customers could decide to leave the region. Potential new customers would be discouraged from locating their plants and businesses in Southwest Virginia.

A 765 kV transmission line will also reduce line losses. The winter peak loss reduction for the Jacksons Ferry Alternative would be 58 MW and 61.5 MW for the Cloverdale Alternative. Line loss reductions are directly reflected in the amount of electricity that must be generated to serve the Company's customers. A reduction in generation necessary to meet customer demand not only saves money, it also reduces pollution.

With regard to the establishment of a competitive market for electricity in Virginia, completion of either of the transmission proposals will improve service reliability and transfer capability throughout the state. Specifically, either the Cloverdale or the Jacksons Ferry option would increase intrastate transfer capability by at least 750 MW. Moreover, either 765 kV transmission line option, in combination with the construction of Virginia Power's proposed 500 kV interconnection at Joshua Falls Station near Lynchburg,[139] would increase west to east power transfer capability in Virginia by more than 2,000 MW.[140] The increased transfer capability and the

[138]Tr. 2858. The North American Electric Reliability Council ("NERC") and the East Central Area Reliability Council ("ECAR") set reliability standards. Power system performance within the eastern region of the United States is evaluated in terms of its adherence to NERC and ECAR standards through simulations and other testing methods prescribed by ECAR, of which AEP is a part.

[139]Case No. PUE910043

[140]Ex. No. BMP-7, Supplemental Direct Testimony at 11. A combination of an AEP 765 kV line with the construction of a Virginia Power 500 kV transmission line from Joshua Falls to Elmont would increase transfer capability into eastern Virginia by 2,200 to 2,400 MW. (Ex. No. CDW-6, at 12).

potential for greater increases in import capability to eastern Virginia would help to maximize the benefits of restructuring for many Virginians by increasing access to competitive suppliers of electricity.

COMPARISON OF WYOMING-CLOVERDALE AND WYOMING-JACKSONS FERRY

As stated in its 1997 application, the Company selected the Wyoming-Cloverdale 765 kV project because it is the most effective, efficient and best long-term solution to improving the reliability of the AEP system's southern transmission network. Nevertheless, the Wyoming-Jacksons Ferry 765 kV Alternative project will also provide an effective solution to the transmission constraints affecting the Central/Eastern APCo areas.[141] The Jacksons Ferry Alternative would be shorter in length (90 miles vs. 132 miles) and less expensive ($232 million vs. $283 million) than the Cloverdale project, but would meet the need for transmission reinforcement for a shorter length of time. The Jacksons Ferry Alternative would provide adequate reliability for 7 to 11 years before requiring additional reinforcement, while the Wyoming-Cloverdale project would provide acceptable and reliable service for a period of 11 to 17 years.[142] For either transmission alternative, the length of time the line remains adequate can be extended by local generation or demand side management measures. Finally, the Jacksons Ferry project produces slightly lower line loss reductions than the Cloverdale project.[143]

The results of load flow studies summarized below[144] demonstrate that both the Cloverdale and Jacksons Ferry alternatives provide a beneficial redistribution of power flow among the AEP system's southern transmission network. In particular, it should be noted that both the Cloverdale and Jacksons Ferry lines would provide very similar relief to the Matt Funk line under normal operating conditions. This chart shows power flows in megawatts during normal operating conditions.

[141]Company witness Pasternak testified that either the Wyoming-Cloverdale project or the Wyoming-Jacksons Ferry project would provide an effective solution to the growing transmission constraints. (Ex. No. BMP-7, Supplemental Direct Testimony at 4). Giles County witness Lewis also concluded that either project would provide a satisfactory solution to the transmission constraints the Company has identified. (Ex. No. WML-18, at 5-8).

[142]This time frame would be from the date the transmission line would go into service, projected to be in 2003/04. (Tr. 2853). Giles County witness Lewis testified that the Jacksons Ferry 765 kV transmission line could provide relief for up to fifteen years. (Tr. 3016).

[143]Ex. No. BMP-7, Second Supplemental Direct Testimony at 6. The Jacksons Ferry project would produce line loss reductions of 43.6 MW to 58 MW for an annual savings of $9 million. The Cloverdale project would produce line loss reductions of 49.4 MW to 61.5 MW for an annual savings of $10.5 million. (Ex. No. PJP-13, Report at 20, 28).

[144]Ex. No. BMP-7, Vol. IX Response to Section I of Guidelines at IV-2 and VI-2.

APCo Interface Power Loading/Flows
2002/03 Winter Peak

APCo North/South Transmission Interface	Power Flow (MW)		
	Before Reinforcement	With Wyoming-Jacksons Ferry	With Wyoming-Cloverdale
Baker-Broadford 765 kV	2716	1803	2023
Culloden-Wyoming 765 kV	955	2885	2728
Kanawha River-Matt Funk 345 kV	1015	781	722
Big Sandy-Busseyville 138 kV	186	172	173
Big Sandy-Inez 138 kV	450	404	402
Amos-St. Albans 138 kV	192	171	171
Kanawha River-Bim 138 kV	85	73	74
Kanawha River-Sundial 138 kV	80	68	69
Kanawha River-Kincaid 138 kV	191	171	172
Kanawha River-Bradley 138 kV	179	159	159
Total Interface	6049	6687	6693

APCo Central/Eastern Transmission Interface	Power Flow (MW)		
	Before Reinforcement	With Wyoming-Jacksons Ferry	With Wyoming-Cloverdale
Broadford-Jacksons Ferry 765 kV	2121	1058	1361
Wyoming-Jacksons Ferry 765 kV	Not In	1903	Not In
Wyoming-Cloverdale	Not In	Not In	1707
Kanawha River-Matt Funk 345 kV	1015	781	722
Bradley-Grandview 138 kV	169	125	127
South Princeton-Glen Lyn 138 kV	-22*	-42*	-45*
Broadford-Smyth 138 kV	181	173	165
Total Interface	3464	3998	4037
*Negative sign indicates power flow is from Glen Lyn to South Princeton			

As shown by this chart, both the Cloverdale Alternative and the Jacksons Ferry Alternative provide similar relief to the critically loaded Matt Funk transmission line under normal operating conditions.

With regard to the number of residences affected in the thousand-foot wide corridor, there is a significant difference between the two proposals. The Cloverdale preferred corridor affects 78 homes while the Jacksons Ferry preferred corridor affects 18 homes. [145]

The two proposals are similar with regard to roadway crossings. Both the Jacksons Ferry and Cloverdale alternatives cross Interstate Highways 77 and 81. However, the Cloverdale route crosses four scenic byways while the Jacksons Ferry route crosses only two scenic byways. [146]

[145] Ex. No. WDM-28, Report at 19.
[146] Ex. No. WDM-28, Report at 19; Ex. No. LJS-21, Second Supplemental Testimony at 5.

Both the Cloverdale and Jacksons Ferry alternatives traverse areas of karst topography. The Cloverdale route impacts the Wilborn Valley-Sugar Run area and the Jacksons Ferry route impacts Skydusky Hollow. An important difference between the two alternatives is that many of the Cloverdale corridors parallel mountains and valleys such as East River Mountain and Wolf Creek. As will be discussed below, this paralleling maximizes the impact on karst terrain. In contrast, the Jacksons Ferry route runs perpendicular to most mountains and valleys thus minimizing the impact on karst terrain.

The Cloverdale corridor impacts six buffer areas for rare and endangered species while the Jacksons Ferry corridor impacts five such areas.[147]

Appalachian Trail

The Appalachian Trail ("AT"), is a National Scenic Trail; the Virginia portion of the AT is 588 miles in length. Both the Cloverdale and Jacksons Ferry transmission corridors must cross the AT. The AT has cooperative agreements with the National Park Service and the U.S. Forest Service which have delegated much of the management of the AT to the Appalachian Trail Conference. In turn, the Appalachian Trail Conference relies on local trail clubs for local management and maintenance. Protestant RATC is the local trail club responsible for the segment of the AT impacted by the proposed transmission corridors. RATC presented four guidelines[148] that it states must be satisfied for any new transmission line crossing of the AT:

1. Any crossing of the AT must represent the only prudent and feasible alternative for meeting an overriding public need.

2. Any project will consist of a single crossing of the AT. Such crossing will occur at locations where the Appalachian Trail experience is already compromised by existing incompatible development.

3. Projects will be so designed to limit impact to the area of the crossing.

4. Mitigation, both on-site and off-site, will be undertaken to result in "no net loss" to the Appalachian Trail experience.

These guidelines are noted in the federal environmental impact statement process. The Jacksons Ferry preferred corridor appears to meet all of the guidelines, while the Cloverdale preferred corridor appears to meet none of the guidelines.

RATC witness Harold Cantill testified that the Wyoming-Cloverdale preferred corridor and its alternatives are unacceptable because they adversely affect the AT experience to a severe degree.[149] Conversely, RATC considers the Wyoming-Jacksons Ferry to be a significant improvement and further, does not oppose the line crossing of the AT near I-77, if sufficient

[147]Ex. No. WDM-28, Report at 20.
[148]These guidelines were the accumulation of review of existing federal documents and communication between the National Park Service, Appalachian Trail Conference, and the Roanoke Appalachian Trail Club. (Tr. 3533).
[149]Tr. 3536.

mitigation is provided.[150] In fact, Michael Dawson, the Appalachian Trail Conference's regional representative for Southwest and Central Virginia, testified, "AEP's preferred route to Jacksons Ferry can be an acceptable solution provided that the Commission determines that a public need for the project exists and that significant mitigation of remaining impacts is proffered." He further stated, "Alternative locations to Jacksons Ferry to the east and the west of the preferred Jacksons Ferry [corridor] were found to have unacceptably high impacts. . ."[151] Mr. Dawson also explained that the Wyoming-Cloverdale preferred corridor and its alternative corridors generally parallel the AT resulting in high impact to the AT. For instance, a typical backpacker would view the Wyoming-Cloverdale transmission line on eight out of eleven days over a distance of one hundred and eight miles. In comparison, the Jacksons Ferry preferred corridor would cause one day of impact to the typical backpacker.

Staff consultant McCoy suggested relocation of an old 88 kV transmission line in Bland County as a possible off-site mitigation to achieve "no net loss" to the AT experience. I find this request should be rejected by the Commission. There is no information on the record pertaining to the siting or engineering aspects of the proposed relocation. It is outside the scope of this case, and would be more appropriately addressed in the federal NEPA[152] process because the primary impact of this line is on the National Forest and the AT.

New River Crossings

The New River traverses the study area from south to north. Both of the proposed transmission lines must cross the New River. Due to the federal Wild and Scenic River Study Designation of the New River downstream[153] from the Glen Lyn Power Plant ("Glen Lyn"), the possible crossings of the New River are limited to the south or upstream from Glen Lyn. [154]

The Cloverdale preferred corridor crosses the New River at Goodwin's Ferry. This section of the New River is open with wide scenic vistas. There is extensive recreational use in this area. For example, just upstream from the Goodwin's Ferry crossing is a business which rents tubes and boats for recreational floating on the river. As the preferred corridor traverses the north face of Buckeye Mountain to its crossing point, the line would be visible from as far away as the Town of Eggleston.

The Jacksons Ferry preferred corridor crosses the New River and the New River Trail State Park near Foster Falls. This crossing will be discussed in detail below.

[150]Tr. 3537.
[151]Tr. 3543.
[152]National Environmental Policy Act.
[153]The New River flows northwest into West Virginia.
[154]Alternate Corridor 5 of the non-Jefferson National Forest ("non-JNF") route crosses the New River in an industrialized area. Although the non-JNF route has the best crossing of the New River, overall the environmental impact of the route is significant. In fact, the Company found the non-JNF route to have such numerous and severe impacts that it did not include that route in the public notice. (Ex. No. RLP-56A, at 13).

CONCLUSION

As discussed earlier in this Report, the proposed Wyoming-Cloverdale line is preferable when considering only transmission reinforcement. However, the Jacksons Ferry project is an acceptable alternative. Based upon UST findings, recommendations of Staff consultant McCoy, comments by the Virginia Department of Environmental Quality and other state agencies, and positions taken publicly by the U.S. Forest Service, the National Park Service, and the Appalachian Trail Conference,[155] the Company recognizes that the Jacksons Ferry project is clearly preferable from an environmental perspective.[156] Mr. Poff reiterated that the Company's overriding concern is to install transmission reinforcement as soon as possible. Taking into consideration the Company's past difficulty obtaining the necessary federal permits, the Company considers the Jacksons Ferry project, for all practical purposes, the most realistic and feasible alternative.[157]

Certainly for the people affected by the Jacksons Ferry route the environmental impact of the proposed transmission line is devastating. However, the Jacksons Ferry Alternative has fewer environmental impacts in virtually every parameter evaluated. Further, the impacts of the Jacksons Ferry route are more easily mitigated. As shown by the chart on page 26, the Jacksons Ferry Alternative provides an acceptable solution to the transmission constraints in Southwest Virginia. Accordingly, I find the Jacksons Ferry 765 kV transmission alternative should be approved.

ROUTE

Tazewell County

In Tazewell County, the Wyoming-Cloverdale preferred corridor could be used for the Wyoming-Jacksons Ferry route as well. However, the UST reviewed this corridor and developed a different and improved route through Tazewell County for the Jacksons Ferry preferred corridor. Both corridors emanate from the certificated corridor in West Virginia. The Jacksons Ferry preferred corridor avoids a proposed industrial park and the Triangle Sportsmen's Club in Tazewell County.

The Town of Bluefield ("Bluefield") supports the Wyoming-Jacksons Ferry preferred route through Tazewell County.[158] The Wyoming-Cloverdale preferred corridor crosses the Bluestone River within a mile of Bluefield's raw water intake point causing concern about water contamination from herbicides. The preferred Wyoming-Jacksons Ferry corridor crosses the headwaters of the Bluestone River approximately eight miles from Bluefield's raw water intake point.

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[155]Because all of the preferred and alternate corridors proposed by AEP for both the Wyoming-Cloverdale and the Wyoming-Jacksons Ferry routes cross portions of the Jefferson National Forest and well as other federally owned or managed lands, the Company must obtain permits from the affected federal agencies.

[156]Section 56-46.1 B of the Code of Virginia requires that the Commission determine "that the corridor or route the line is to follow will reasonably minimize adverse impact on the scenic assets, historic districts and environment of the area concerned."

[157]Tr. 3672, 3673.

[158]Tr. 2545.

I find that the Jacksons Ferry preferred corridor through Tazewell County should be approved. This corridor was developed after input from the public and local officials and it constitutes a far superior route in Tazewell County.

Hogback Mountain Alternative Corridor

The Hogback Mountain alternative corridor ("Hogback Alternative") lies on the western slope of Hogback Mountain and is two-tenths of a mile shorter than the preferred corridor within the Jefferson National Forest ("JNF"). The Hogback Alternative would move the transmission line further away from Kimberling Creek Wilderness area. Although the preferred corridor skirts the wilderness area, it is located in a designated modification zone.[159] The Hogback Alternative crosses partial retention and retention designated areas, and has far greater visual impact to I-77, the Town of Bastian and the AT. The RATC stated that the Hogback Alternative would require more mitigation than the preferred corridor.[160] I find the Hogback Alternative should be rejected.

Skydusky Hollow

Both the preferred and alternate corridors of the Jacksons Ferry route traverse Skydusky Hollow. Dr. Simutis of the UST explained that a range of cultural and visual resources as well as other environmental factors led to the location of the preferred and alternate corridors in Skydusky Hollow. One factor is that Crocket Cove is located on the southern side of Walker Mountain (across the mountain from Skydusky Hollow). The UST considers Crocket Cove to have significant historical and visual value. From I-77 east to Skydusky Hollow is U.S. Forest Service land that is designated as a roadless and semi-primitive non-motorized area. Beyond the Forest Service land lies the urbanized area around Dublin, Virginia. Finally, Skydusky Hollow provides an acceptable crossing of the AT, primarily because an existing 138 kV transmission line crosses the AT in this area.[161]

Alternate Corridor K[162] would parallel the existing 138 kV transmission line as it traverses Skydusky Hollow and crosses Walker Mountain. The preferred and alternate corridors of the Jacksons Ferry route would join on the south side of Walker Mountain. Alternate Corridor K was proposed because it has less overall impact on Forest Service land than the preferred corridor. It has, however, a far greater visual impact on the AT. This alternative also crosses the north slope of Walker Mountain very near a documented location for the Indiana Bat, an endangered species. I find Alternate Corridor K should be rejected.

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[159]The Forest Service evaluates its visual assets by means of a visual management system. In its applications, the Company used Forest Service visual quality objectives ("VQO") in determining its corridors. The designation "modification" indicates that some alterations of the landscape can be permitted. "Partial retention" and "retention" indicate less tolerance for change in the viewshed.

[160]Ex. No. HAC-44, at 2

[161]Tr. 3660-63.

[162]There are many alternative corridors that were examined in the course of this proceeding. For purposes of this Report I have discussed only the alternate corridors that are most feasible.

Skydusky Hollow is a significant karst area with extensive caves and several endangered species.[163] However, Skydusky Hollow is already impacted by an existing 138 kV transmission line built approximately 50 years ago. The Company is aware of the environmental concerns regarding this area and plans to implement prevention measures to guard against fuel spills, erosion, and herbicide contamination. The Company also agreed to conduct a karst inventory before the application of herbicides to identify the areas that are sensitive to groundwater pollution.[164] Further mitigation measures are discussed below.

New River Trail State Park

The New River Trail State Park (the "Park") is approximately 58 miles long and is located on the site of an abandoned rail line that follows the New River. The preferred corridor of the Jacksons Ferry route crosses the New River and the Park just downstream from Foster Falls. This crossing is located at a bend in the river where there are a series of small rapids. Baker Island, upstream from the corridor crossing, is a part of the Park system and future plans are for campsites to be developed on the island. The view of the transmission line from Baker Island would be blocked by surrounding mountains and a bend in the river.[165] Further, with the six bundle conductor design and the noise from the rapids, noise from the transmission line should be negligible. The Park trail is surrounded by large, heavily canopied trees, which would screen the line from view in the leaf-on season. On the side of the trail opposite the river, the Park is flanked by high cliffs. The transmission line could span the river at this point at a very high height, thereby preserving most of the trees.[166]

I find the Jacksons Ferry preferred corridor should be approved,[167] subject to the five modifications set forth below.[168]

Modifications

The first modification is located on that portion of the line which is south of US 19/460 on the north slope of East River Mountain.[169] A property owner, Rick Compton has requested that the centerline of the preferred corridor be relocated approximately 1200 feet to the west and south to minimize the impact on a subdivision being developed by Mr. Compton. No additional environmental impacts would result from this adjustment.

The second modification would relocate the southwest boundary of the preferred corridor approximately 600 feet to the northeast in Crockett Cove.[170] This adjustment would decrease the visibility of the line to the residents of Crockett Cove by moving the corridor onto the Jefferson

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[163]Of significant concern are the Indiana Bat, Virginia Big-Eared Bat and the Eastern Small-Footed Bat that have been identified within the project area.
[164]Tr. 3709-12.
[165]I rafted the New River at each proposed crossing and the observations made here and in other parts of this Report are a result of this field work.
[166]Ex. No. MM-17.
[167]A description of the Jacksons Ferry preferred corridor is attached as an appendix to this Report.
[168]Staff consultant McCoy also supports these modifications. (Tr. 3264).
[169]Ex. No. LJS-21, Rebuttal Testimony at 3, Schedule 1.
[170]Id., Rebuttal Testimony, Schedule 2.

National Forest in land classified by the Forest Service for modification. The Visual Quality Objective of "modification" means that man-made activity may dominate the landscape, but the visual characteristics of the man-made activity must blend with the surrounding landscape. This adjustment would have a minimal effect on the forest and no additional environmental impacts are associated with this adjustment.

The third modification is located in the Gunston Park community near the Wythe/Pulaski County line.[171] This adjustment would relocate the corridor approximately 1000 feet northeast near Route 610 to reduce visibility of the line to residents. This adjustment also will encroach approximately 300 feet on Forest Service land which is classified for modification. There are no additional environmental impacts resulting from this adjustment.

The fourth modification would move the preferred corridor to the west and south near the River Hills Subdivision on the New River.[172] This adjustment would mitigate the impact of the transmission line on the recreation and river access common area of the River Hills Subdivision. With this change, the preferred corridor is relocated approximately 500 feet to the west on the northeastern slope of Chestnut Ridge before crossing the New River and the New River Trail State Park. As Staff consultant McCoy noted, this change in alignment would have several benefits. It would move the towers out of the River Hills Subdivision common area. It would move the line away from a log cabin owned by Donald Frazier. Additional height would be gained over the river crossing to further reduce visual impact to boaters.[173] There would be no additional impact to the New River Trail State Park.

The fifth modification moves the preferred corridor approximately 4200 feet to the southwest as the corridor crosses Rich Mountain to the west of I-77.[174] While the preferred corridor parallels an existing 88 kV line, the combination of the two lines in a shared right-of-way would have a greater visibility from I-77. This adjustment mitigates the visual impact without creating any additional adverse environmental impacts.

I find that these five modifications should be adopted and incorporated into the Jacksons Ferry preferred route.

Weaver Enterprises, Inc. ("Weaver Enterprises") owns and/or is in the process of negotiating the purchase of several thousand acres of land at the intersection of Interstates 77 and 81. The Jacksons Ferry preferred corridor crosses this land prior to crossing the New River. Counsel for Weaver Enterprises requested that the preferred corridor be moved to the east[175] to avoid this block of land. After studying the maps and observing from the air, I cannot recommend this modification because it would impact existing homes and require a less favorable crossing of the New River and the New River Trail State Park.

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[171] Id., Rebuttal Testimony, Schedule 3.
[172] Id., Rebuttal Testimony, Schedule 4.
[173] Ex. No. WDM-28, Report at 37.
[174] Ex. No. LJS-21, Rebuttal Testimony at 5, Schedule 5.
[175] Tr. 2547.

ENVIRONMENTAL IMPACTS

Homes

Va. Code § 56-46.1 D requires consideration of the probable effect of the transmission line on the health and safety of the persons in the area concerned.

Under the Company's policy, if homes are located within 100 feet of the edge of the right-of-way, homeowners are allowed up to a year after the transmission line is energized to decide if they want to sell their home. If a homeowner does decide to sell, the Company will offer to purchase the home at 100 % of fair market value.[176]

The impact of a transmission line on property values is a consideration in this proceeding. Public witnesses, as discussed previously, believe property values will diminish if the transmission line is built. In rebuttal, the Company presented the testimony of William N. Kinnard, Jr. Ph. D., an expert in real estate values.[177] Dr. Kinnard prepared and presented a report entitled *The Impact of Proximity to and Visibility of 765 kV Transmission Lines on Sales Prices of Nearby Residences and Vacant land in Six Counties of Southwestern Virginia 1998-1997*. Based on his research, Dr. Kinnard concluded that no consistent or systematic impact on real estate prices of properties within one-fourth of a mile of a 765 kV transmission line was found, except for properties actually traversed by the right-of-way. Dr. Kinnard's testimony and report were stipulated into the record without cross-examination.[178]

The Jacksons Ferry route, as noted, is much shorter than the Cloverdale route and impacts far fewer residences.[179] While the impact on property values cannot be avoided, it can be minimized with the shorter route and final right-of-way siting.

Noise

Public witnesses complained of the noise levels associated with existing high voltage transmission lines. In the construction of the proposed transmission line, the Company would use a six conductor bundle design. Current high voltage transmission lines use a four bundle conductor design. Company witness Jones testified that the new conductor design will reduce audible noise from the line during inclement weather by approximately five decibels. The five decibel reduction means that the audible noise at 100 feet from the centerline of the proposed six conductor bundle line (at the edge of the right-of-way) will be about the same as the audible noise level at 250 feet from the centerline of an existing four conductor bundle 765 kV line.[180] During my field work, I stood under 765 kV lines with two, four, and six bundle configurations. The reduction in noise level between the two bundle design and the six bundle design is significant.

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[176]Tr. 3684, 3685.
[177]Dr. Kinnard is president of the Real Estate Counseling Group, Inc. and Professor Emeritus, Finance and Real Estate, at the University of Connecticut. He is a certified general real estate appraiser in over a dozen states, including Virginia and has testified as an expert witness in over twenty states.
[178]Tr. 3273.
[179]The Cloverdale preferred corridor affects 78 homes as opposed to 18 homes for the Jacksons Ferry preferred corridor.
[180]Ex. No. TLJ-1, Rebuttal Testimony at 5.

Visual Impact

The Company will use guyed V towers[181] wherever possible to mitigate the visual impact of the transmission line. The Company also proposes to use a dark finish on the towers and non-specular conductors which will reduce reflective light.[182]

Electric and Magnetic Fields ("EMF")

Many witnesses at the public hearings voiced concern over the health effects of EMF radiating from the proposed transmission line. Various epidemiological studies over the past twenty-five years have indicated some correlation between EMF and certain cancers. The Company presented Dr. Edward P. Gelman and Dr. Darwin R. Labarthe to address these concerns and assess the most recent developments in the study of the health effects of EMF.

EMF is created by the flow of electricity. Electric transmission and distribution lines, electrical wiring in homes, and all electrical appliances and equipment have electric and magnetic fields associated with their use. Electric field levels are determined by the voltage level of the line, the physical characteristics of the line and the distance from the source at which the field is measured. Similarly, magnetic fields generated by a transmission line vary with the current in the line, the physical characteristics of the line, and the distance from the source at which the field is measured. EMFs dissipate rapidly as one moves away from the source. For instance, the field strength at the conductor of a 765 kV transmission line would be in the range of 5,000 milligauss ("mG"). The level of this field strength would dissipate significantly in the distance from the conductor to the edge of the right-of-way (approximately 100 feet).[183]

Expected EMF levels at the edge of the right-of-way for the 765 kV line are projected to be as follows:[184]

Line Loading:

I. 2000 MW
This loading represents the maximum expected loading under normal operating conditions.

II. 3500 MW
This loading represents the upper level expected loads during very limited periods of time when the system is subjected to severe contingency conditions.

[181]Both a standard tower and a guyed V tower are depicted in Appendix A of this Report. The standard tower would be used at angle points and guyed V towers would be used primarily where the corridor is in a straight line.
[182]Ex. No. RLP-56D, at 12.
[183]Tr. 2560-2562.
[184]Company Vol. III Response to Sections II-V of Guidelines at 33.

Right-of-Way Width: 200 feet.

	Conductor Height (ft.)	Electric Field (kV/m)	Magnetic Field (mG)
I.	80	3.2	50
	44	4.4	76
II.	80	3.2	88
	44	4.4	135

Note: Eighty feet represents a typical conductor height while forty-four feet represents the minimum conductor height.

Dr. Gelman[185] has conducted cancer research for over twenty years and has investigated the processes by which cells become cancerous. He was asked by AEP to conduct a search of the literature on biological and experimental research related to power frequency electric and magnetic fields. He was also asked to assess this scientific literature in the area of cancer and molecular and cellular biology and to assess whether power frequency magnetic fields cause any adverse genetic, molecular, and/or cellular effects that could lead to cancer or other adverse health effects.[186]

Dr. Gelman organized the scientific evidence into five categories: (1) DNA damage and mutation studies, (2) chromosome studies, (3) cancer promotion studies, (4) animal studies, and (5) tumor growth studies. These categories include the standard types of tests that are conducted to determine whether an agent causes molecular or cellular change that can lead to cancer or other adverse health effects.

Based on his training and experience in the fields of cancer and molecular and cellular biology, Dr. Gelman concluded that the extensive research provides no scientific support that power frequency electric and magnetic fields cause, promote, or contribute to the development of cancer or other adverse health effects.[187] Dr. Gelman pointed out that this conclusion is consistent with conclusions reached by independent scientific commissions and agencies that have reviewed this research.[188]

Dr. Labarthe is a medical doctor, researcher, teacher, and specialist in epidemiology and public health. He is currently employed by the United States Centers for Diseases Control and Prevention in Atlanta, Georgia. Dr. Labarthe was asked by AEP to conduct an independent literature search to identify the epidemiologic research regarding power frequency electric and/or

[185]Dr. Gelman is Professor of Medicine in the Division of Hematology/Oncology, Professor of Anatomy and Cell Biology, and Vice Chair of the Department of Medicine at the Georgetown University Medical School in Washington, D.C.
[186]Ex. No. EPG-2, at 5.
[187]Id. at 18.
[188]These commissions and agencies include the National Academy of Sciences, the National Institute of Environmental Health Sciences, the American Medical Association, the Oak Ridge Associated Universities, the National Radiological Protection Board of the United Kingdom, and the Virginia Department of Health.

magnetic fields, and to critically examine this scientific literature to determine whether there is a scientific basis to conclude that these fields cause cancer or other adverse health effects.

Dr. Labarthe explained that, if the epidemiologic research demonstrates a consistent increase in the magnitude of effect with increased exposure to the agent (in this instance EMF), this evidence is supportive of a causal association or a dose-response relationship. "Consistency" means that the association between an exposure and a disease should be seen within individual studies and across the group of studies that have examined the exposure.[189] Dr. Labarthe stated that the studies on power frequency EMF and human health fail to show a dose-response relationship and fail to show a consistent pattern of increased risk of disease or illness associated with field exposure either within or across studies. Finally, Dr. Labarthe asserted there is neither specificity of disease or illness nor a time relationship of exposure and disease that indicates a cause-effect relationship.[190]

In October of 1996, a panel of scientists commissioned by the National Research Council of the National Academy of Sciences ("NAS") issued a review of research on power frequency fields. This panel concluded:

> The current body of evidence does not show that exposure to these fields presents a human-health hazard. Specifically, no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and development effects.[191]

Other reports prepared by scientific commissions provide reviews of EMF research. These include reports prepared by the Virginia Department of Health (1998), the Connecticut Interagency Task Force Studying Electric and Magnetic Fields (1998), the International Commission on Non-Ionizing Radiation Protection (1998), the National Institute of Environmental Health Sciences ("NIEHS") Working Group (1998), and most recently, the National Academy of Sciences/National Research Council (NAS 1999).

The most recent reports from the NAS and the NIEHS examine the results of the six-year, $44 million U.S. national EMF research program, known as the EMF Research and Public Information Dissemination Program ("EMF RAPID"). The NAS concluded that the research conducted under the EMF RAPID Program does not support a conclusion that there is a public health danger from exposure to EMF. The NIEHS reached a similar conclusion, and described the scientific evidence of any health risk from EMF as weak and marginal. The NIEHS noted that some epidemiology studies have reported a possible but unproven association with leukemia, and that this unproven association is not supported by any consistent findings from extensive laboratory and animal research.

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[189] Reproduction of results is a fundamental element of scientific research.

[190] Ex. No. DRL-3, Direct Testimony at 22.

[191] Committee on the Possible Effects of Electromagnetic Fields on Biologic Systems, *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields* at 1 (1996).

Dr. Labarthe described the recent United Kingdom Childhood Cancer Study ("UKCC") (December 1999) conducted by Sir Richard Doll[192] and colleagues as the most significant of recent studies. This large scale study involved all children ages 0 through 14 in England, Scotland, and Wales who were diagnosed with a malignant cancer in the time period between 1991 and 1995. A detailed assessment of their EMF exposure was made based on measurements of magnetic fields in homes and schools, proximity of power lines and other electrical facilities to homes, and use of electrical appliances. The cancer risk of children with average exposures below 1 mG was compared to that of children with average exposures above 1 mG. The researchers found no statistically significant increased risk among children in the higher exposure groups for any type of cancer, including leukemia, brain cancer and other cancers.

After reviewing the epidemiologic studies, Dr. Labarthe concluded that a cause and effect relationship between exposure to magnetic fields and any adverse human health effect has not been established.[193] Furthermore, Dr. Labarthe testified that there is no scientific basis to conclude that the electric and/or magnetic fields from the proposed transmission line will cause or contribute to adverse health effects in humans or pose a danger to the general public health.[194]

The most recent epidemiologic studies have strengthened the conclusion that there is no association between EMF and cancer. This is especially true for studies involving transmission lines. The studies conducted by Strumza (1970), Feychting (1994), Schrieber (1995), Verkasalo (1996), and Linet (1997) failed to show a statistically consistent increased risk of cancer for adults living in homes near power lines.[195] Studies conducted in Scandinavian countries examined estimated magnetic field exposures by using historical records of the levels of electric current on transmission lines and the distance between the lines and residences. These studies failed to show consistent relationships between childhood cancer and any index of exposure when various groups within the study population were considered.[196] Of particular note are the UKCC and NAS/NIEHS conclusions. These studies were conducted by leading scholars in the field and appear to be completely unbiased. The conclusion of these prestigious bodies was that EMF neither causes nor contributes to the development of cancer. Based on the record in this case, I find there is no indication that EMF from the proposed transmission line would pose a threat to human health or safety.

Air Pollution

Many public witnesses were concerned about air pollution resulting from increased generation attributable to the proposed transmission line. Staff witness W. Timothy Lough investigated this issue and testified that increased air pollution could result from increased generation at AEP's Midwest power plants as a result of the proposed line. Dr. Lough reviewed studies used by the federal Environmental Protection Agency and Federal Energy Regulatory Commission and concluded that increased generation associated with the proposed transmission line

[192]Sir Richard Doll was one of the first epidemiologists to identify the association between smoking and lung cancer, and is one of the most respected epidemiologists in the world.
[193]Tr. 2585.
[194]Ex. No. DRL-3, Direct Testimony at 24.
[195]Id. at 18.
[196]Id. at 15.

would have a minimal effect on air pollution emissions. Staff also concluded that federal programs to control air pollution should be adequate to minimize any adverse environmental impact.[197]

Karst Terrain

Karst is a geologic term meaning landscapes and landforms created from the dissolving of rock by natural waters. It includes features such as caves, sinkholes, sinking streams, springs, and solution valleys.[198] Dr. Ernst Kastning described the AEP environmental study (for the Wyoming-Cloverdale route) as "grossly inadequate in terms of the inventory of karst in Giles County."[199] Specifically, Dr. Kastning asserts the Company has failed to identify some of the most significant caves and karst in the paths of the proposed corridors.[200]

Dr. Kastning maintains that the most important environmental issue with respect to karst is the sensitivity of karstic aquifers to groundwater contamination. Water in karstic aquifers moves rapidly through underground conduits with virtually no cleansing or filtration of contaminants. Sinkholes form a conduit through which groundwater enters the underground aquifers. Any contaminants will be carried by the groundwater into the underground aquifers and to discharge points such as springs and wells. Dr. Kastning's concern is that chemicals introduced during the construction or later maintenance of the power lines will migrate rapidly to people's water sources.[201] Water supplies may also be damaged by erosion. Sediment from erosion can alter drainage characteristics in the aquifer which might result in a reduction in the yield of springs or wells.

Dr. Kastning stated that, in general, the routes of the Jacksons Ferry Alternative appear to impact karst in fewer places. However, he noted that Skydusky Hollow[202] in Bland County is recognized as a significant karst area.[203]

William Orndorff, a geologist testifying on behalf of Bland County, also recommended that the Company's application be rejected. Mr. Orndorff testified that the Jacksons Ferry corridors cross several belts of environmentally sensitive karst lands. Mr. Orndorff stated that the karst in Walker Creek Valley and along the north slope of Walker Mountain (which includes Skydusky Hollow) comprises some of the most significant and relatively pristine karst geology and habitat in Virginia.

I find the proposed project will reasonably minimize adverse impacts upon karst and groundwater resources. Company witness Poff acknowledged the concerns and proposed mitigation measures. These mitigation measures appear to be sound. In the siting process, the Company will make every reasonable attempt to determine if caves or other karst formations are

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[197]Tr. 3269-70.
[198]Ex. No. EHK-41, Consolidated Direct Testimony Vol. I at 1, 2.
[199]Id. at 9. Dr. Kastning is a Professor of Geology at Radford University and a certified professional hydrogeologist by the American Institute of Hydrology. Dr. Kastning has over 30 years of experience in investigating karst processes.
[200]Id. at 12.
[201]Id. at 33.
[202]I spent five to six hours in the Newberry – Bane cave system in Skydusky Hollow observing firsthand the extensive karst system in this area.
[203]Id. at 45.

located at proposed tower sites. These measures would include surface investigations and possibly core drillings. The Company will engage a karst expert to assist in the right-of-way siting process. The Company would have flexibility to move tower locations within the thousand-foot corridor to avoid karst formations. Certainly the Company has a vested interest in avoiding the placement of its towers in unstable locations. Finally, it should be remembered that the Company has been constructing electric lines in this region for over 100 years. There is no indication in the record of this proceeding that the Company has ever lost a tower to karst, or that the lines in Southwest Virginia currently operated and maintained by the Company have adversely affected groundwater, karst, or subterranean flora or fauna.

Construction Mitigation Measures and Right-of-Way Maintenance

Once a route has been selected and a two hundred-foot right-of-way within the thousand-foot corridor has been surveyed, the Company will inventory the vegetation and prepare a plan for clearing the right-of-way. During clearing, the Company will employ selective cutting practices for all areas of the right-of-way with the exception of access roads and other construction sites. Areas with one hundred-foot conductor to ground clearance will not be cleared.

The Company stated it will strictly adhere to Virginia's Erosion and Sedimentation Control Guidelines ("the E&SC Guidelines"), mandated by the Department of Conservation and Recreation, Division of Soil and Water Conservation, for all new construction.[204] Strict adherence to these guidelines, implemented in 1975, will undoubtedly diminish soil erosion during construction. In addition, the Company agreed to implement the mitigation measures recommended by Staff consultant McCoy[205] for the construction and maintenance of the transmission line.[206]

When maintaining the right-of-way, only tall growth plants will be targeted for cutting or treatment with herbicides.[207] There will be no aerial application of herbicides; rather, low-pressure backpack sprayers will be used. Only herbicides that have been registered[208] by the U.S. Environmental Protection Agency and the Virginia Department of Agriculture and Consumer Services ("VDACS") will be applied. All applicators will be registered by the VDACS and will be under the direct supervision of licensed certified applicators.[209] Two hundred-foot buffer zones, in which no herbicides will be used, will be established around wetlands, sinkholes and from the "sink of a stream"[210] or where a stream goes underground.

[204]Ex. No. RLP-56D, at 5. The Company will follow the "Guidelines for Siting, Line Design and Construction of 765 kV Transmission Line Right-of-Way and Structures" attached to Mr. Poff's Rebuttal Testimony as Schedule 1. (Ex. No. RLP-56D, at 4).
[205]Ex. No. WDM-28, at 43.
[206]Ex. No. RLP-56D, at 8.
[207]Application of herbicides to electric utility rights-of-way occurs every five to seven years.
[208]This means that these herbicides may be safely used when applied in accordance with label instructions and commonly accepted practices.
[209]Ex. No. HLG-27C at 8.
[210]Ex. No. HLG-27C at 5.

The Company stated that it will consider a broad range of issues including engineering, cultural, visual and natural resource impacts along with appropriate mitigation prior to final design and construction of the transmission line.[211] For example, Company witness Poff stated the Company will provide a very detailed level of specifications in its construction contract that will ensure its contractor will have appropriate materials and equipment on hand to contain and remediate any spills in accordance with applicable laws and regulations.[212]

Herbicides have been used extensively for years on farms, roadways, railroads, and for utility right-of-way maintenance. Moreover, AEP has for years used aerial spraying to maintain the right-of-way for the 138 kV transmission line that crosses Skydusky Hollow. AEP's right-of-way maintenance practices have not resulted in any reported contamination.[213]

Dr. Kastning recommended that dye trace studies be performed prior to approval of any transmission corridor to assess karst and related features. I find this recommendation to be impractical and unnecessary. Karst is dynamic. For instance, sinkholes can appear at any time. The best approach to applying herbicides in karst terrain, especially Skydusky Hollow, is to conduct a survey of the karst terrain prior to application. I find that risks to karst and groundwater can be effectively mitigated with the detailed siting guidelines and mitigation measures the Company has agreed to implement.[214] Further, the Company will use karst experts in siting the transmission line and tower locations. All areas of carbonate rock and their allogenic recharge areas will be identified during the siting of the 200-foot right-of-way.[215]

Bats

Virgil Brack, Jr.,[216] was retained by AEP to provide expert testimony on issues concerning the Indiana bat and related endangered species. Prior to filing his testimony, Dr. Brack explored major caves in proximity to the Company's proposed and alternative corridors for the Wyoming-Jacksons Ferry 765 kV route in the Skydusky Hollow area. In the process of making nineteen trips into twelve caves and fourteen cave entrances, the only endangered species of bat encountered by Dr. Brack was the Indiana bat. A total of 170 Indiana bats were counted in the Newberry-Bane Cave system in November of 1999; 235 Indiana bats were found in the same cave system in February of 2000. A single Indiana bat was found in the Buddy Penley Cave in November of 1999. No other federally listed endangered species of bats were found in the caves visited.[217]

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[211]Ex. No. RLP-56D at 4.
[212]Id. at 13.
[213]Tr. 3393-94; 3376-77.
[214]Ex. No. RLP-56D at Schedules 1 and 2.
[215]Id. at 4.
[216]Dr. Brack holds an undergraduate degree in wildlife management sciences from the University of Missouri-Columbia; a master's degree in physiological ecology from the University of Missouri-Columbia with a thesis on the hibernation of bats under natural conditions; and a Ph.D. in Wildlife Ecology from Purdue University with a dissertation on the non-hibernating ecology of bats. Dr. Brack has been trained in compliance issues pursuant to the National Environmental Policy Act, the Endangered Species Act and other environmental statutes and regulations. (Ex. No. VB-26, at 1-2).
[217]Ex. No. VB-26, at 4.

Dr. Brack testified that it is improbable that electric fields generated by the power line will have any adverse effect on hibernating endangered bats. Electric fields diminish rapidly as the distance from the source increases, and are effectively blocked by rock, soil and vegetation. Bats hibernate underground, encased in rock. The entrance to the Newberry-Bane Cave is 6,650 feet from the preferred corridor of the Wyoming-Jacksons Ferry route. The entrance to the Buddy Penley Cave is 5,000 feet from the preferred corridor. Therefore, it is unlikely that hibernating bats or other organisms living in caves will be subjected to electric fields generated by the proposed power line.[218]

Protestant witness Orndorff, at page 11 of his report, notes that it is not known whether the "low-pitched hum characteristically heard around such power lines would disturb hibernating bats and/or interfere with their echolocation systems."[219] Dr. Brack testified that he is unaware of any scientific research that would support Mr. Orndorff's conclusion.[220] The noise levels associated with the six-conductor bundle to be used by the Company should significantly reduce the noise produced by the transmission line. With the distance from the corridors to cave entrances and the fact that sound will be abated by the rock forming the caves, it is unlikely that any sound from the transmission line will penetrate the bat hibernaculum.

The Company states it is committed to the process of expert site-specific investigation, consultation with federal and state agencies, and development and implementation of an acceptable mitigation plan for the bats.[221] Taking into consideration the likely impact of the proposed transmission line on the bat population and the mitigation measures that must be developed and implemented to comply with state and federal guidelines, I find it improbable that the proposed transmission line will have an effect on any endangered bat species.

Cultural Attachments

It is clear from the testimony heard at the public hearings that area residents have a strong cultural attachment to the land. Protestants offered a study by Melinda Wagner, Ph.D. pertaining to people's cultural heritage and attachment to the land which she based on a survey taken of residents in the area. On cross-examination it became evident that significant bias had been involved in the survey supporting the study's conclusions.[222] While residents' cultural concerns are certainly recognized, this study has been given little weight as evidence in this proceeding.

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[218]Company witness Jones also testified that electric fields are easily shielded by trees, vegetation and rocks that will reduce the electric fields to levels approaching zero. For example, cave-dwelling organisms living underground directly beneath the line would be completely shielded by the overlying rock, soil and vegetation from exposure to electric fields generated by the transmission line. (Ex. No. TLJ-1, Rebuttal Testimony at 2.)

[219]Ex. No. WDO-38.

[220]Ex. No. VB-26, at 10.

[221]Dr. Brack has served for over ten years on the U.S. Fish and Wildlife Service recovery team for the Indiana bat. (Tr. 3211, 3212). Dr. Brack is confident that mitigation measures can be developed and implemented that will protect the bat population and allow the project to proceed. (Tr. 3224).

[222]Tr. 3616-3642.

FINDINGS AND RECOMMENDATIONS

Based on the evidence presented in this case, I find that:

1. There is a compelling need for transmission reinforcement in Southwest Virginia;

2. The Wyoming-Jacksons Ferry 765 kV transmission project is the most appropriate solution to meet this need and should be approved;

3. Alternatives, including combinations of alternatives, to a transmission line have been thoroughly explored and for reasons involving cost and/or technical feasibility and environmental impact are not adequate solutions;

4. There is a need for the proposed 765 kV bus extension at Cloverdale Station;

5. The Wyoming-Jacksons Ferry preferred corridor, with the modifications recommended herein, has fewer overall environmental impacts and should be approved;

6. The EMF produced by the transmission line should not constitute a human health threat;

7. The right-of-way mitigation measures proposed by the Company should be adopted. The mitigation measures are to include, but not be limited to, the following: (a) there should be no aerial spraying of herbicides; (b) application of herbicides should be made by use of backpack sprayers; (c) an inventory of karst features should be conducted prior to any application of herbicides; and (d) a two hundred-foot buffer should be established around all cave entrances, sinkholes, wetlands, streams, springs or other riparian features;

8. The use of darkened steel towers, non-specular wire and a six bundle conductor configuration should be employed;

9. Paralleling of existing right-of-way has been considered in all feasible instances and the Company has provided adequate evidence that additional paralleling of existing right-of-way is not practical; and

10. The Commission should not require off-site mitigation as requested by the Roanoke Appalachian Trail Club as a condition for approval of the Company's application.

I therefore **RECOMMEND** that the Commission enter an order that:

1. ***ADOPTS*** the findings contained in this Report;

2. ***GRANTS*** the Company's application to construct a 765kV transmission line to the Jacksons Ferry Station and to construct a 500 kV bus extension at the Cloverdale Station;

3. ***AMENDS*** the Company's current certificates of public convenience and necessity to authorize construction of the proposed transmission line and bus extension; and

4. ***DISMISSES*** this case from the Commission's docket of active cases.

COMMENTS

The parties are advised that any comments (Section 12.1-31 of the Code of Virginia and Commission Rule 5:16(e)) to this Report must be filed with the Clerk of the Commission in writing, in an original and fifteen (15) copies, within twenty-one (21) days from the date hereof. The mailing address to which any such filing must be sent is Document Control Center, P.O. Box 2118, Richmond, Virginia 23218. Any party filing such comments shall attach a certificate to the foot of such document certifying that copies have been mailed or delivered to all counsel of record and any such party not represented by counsel.

Respectfully submitted,

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Howard P. Anderson, Jr.
Hearing Examiner